Dell Precision™ WorkStation 610
Mini Tower Systems

USER'S GUIDE

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Safety Instructions

Use the following safety guidelines to help protect your computer system from potential damage and to ensure your own personal safety.

When Using Your Computer System

As you use your computer system, observe the following safety guidelines.

WARNING: Do not operate your computer system with any cover(s) (including computer covers, bezels, filler brackets, front-panel inserts, and so on) removed.

- To help avoid damaging your computer, be sure the voltage selection switch on the power supply is set to match the AC power available at your location:
  - — 115 volts (V)/60 hertz (Hz) in most of North and South America and some Far Eastern countries such as Japan, South Korea, and Taiwan
  - — 230 V/50 Hz in most of Europe, the Middle East, and the Far East

  Also be sure your monitor and attached peripherals are electrically rated to operate with the AC power available in your location.
- Before working inside the computer, unplug the system to help prevent electric shock or system board damage. Certain system board components continue to receive power any time the computer is connected to AC power.
- To help avoid possible damage to the system board, wait 5 seconds after turning off the system before disconnecting a device from the computer.
- To help prevent electric shock, plug the computer and peripheral power cables into properly grounded power sources. These cables are equipped with three-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a three-wire cable with properly grounded plugs.
- To help protect your computer system from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).
- Be sure nothing rests on your computer system's cables and that the cables are not located where they can be stepped on or tripped over.

- Do not spill food or liquids on your computer. If the computer gets wet, consult your *Diagnostics and Troubleshooting Guide.*
- Do not push any objects into the openings of your computer. Doing so can cause fire or electric shock by shorting out interior components.
- Keep your computer away from radiators and heat sources. Also, do not block cooling vents. Avoid placing loose papers underneath your computer; do not place your computer in a closed-in wall unit or on a bed, sofa, or rug.

Ergonomic Computing Habits

WARNING: Improper or prolonged keyboard use may result in injury.

For comfort and efficiency, observe the following ergonomic guidelines when setting up and using your computer system:

- Position your system so that the monitor and keyboard are directly in front of you as you work. Special shelves are available (from Dell and other sources) to help you correctly position your keyboard.
- Set the monitor at a comfortable viewing distance (usually 510 to 610 millimeters [20 to 24 inches] from your eyes).
- Make sure the monitor screen is at eye level or slightly lower when you are sitting in front of the monitor.
- Adjust the tilt of the monitor, its contrast and brightness settings, and the lighting around you (such as overhead lights, desk lamps, and the curtains or blinds on nearby windows) to minimize reflections and glare on the monitor screen.
- Use a chair that provides good lower back support.
- Keep your forearms horizontal with your wrists in a neutral, comfortable position while using the keyboard or mouse.
- Always leave space to rest your hands while using the keyboard or mouse.
- Let your upper arms hang naturally at your sides.
- Sit erect, with your feet resting on the floor and your thighs level.
- When sitting, make sure the weight of your legs is on your feet and not on the front of your chair seat. Adjust your chair's height or use a footrest, if necessary, to maintain proper posture.
- Vary your work activities. Try to organize your work so that you do not have to type for extended periods of time. When you stop typing, try to do things that use both hands.

monitor screen at or below eye level
wrists relaxed and flat
monitor and keyboard positioned directly in front of user
arms at desk level
feet flat on the floor

When Working Inside Your Computer

Before you remove the computer cover, perform the following steps in the sequence indicated.

CAUTION: Do not attempt to service the computer system yourself, except as explained in this guide and elsewhere in Dell documentation. Always follow installation and service instructions closely.

To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.

1. **Turn off your computer and any peripherals.**
2. **Disconnect your computer and peripherals from their power sources. Also, disconnect any telephone or telecommunication lines from the computer.**

   Doing so reduces the potential for personal injury or shock.

3. **Touch an unpainted metal surface on the chassis, such as the metal around the card-slot openings at the back of the computer, before touching anything inside your computer.**

   While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.

In addition, take note of these safety guidelines when appropriate:

- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, make sure both connectors are correctly oriented and aligned.
- Handle components and cards with care. Don't touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a microprocessor chip by its edges, not by its pins.

WARNING

There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface on the computer chassis.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

The following caution may appear throughout this document to remind you of these precautions:

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

Preface

About This Guide

This guide is intended for anyone who uses the Dell Precision 610 mini tower computer systems. It can be used by both first-time and experienced computer users who want to learn about the features and operation of the systems or who want to upgrade their computers. The chapters and appendixes are summarized as follows:

- Everyone should read Chapter 1, "Introduction," for an overview of the system features and information on where to get help if you need it.
- Everyone should read the first few sections of Chapter 2, "Using the Software Support Utilities," to find out which utilities and drivers have been included with the system. Only users who want to use one of the utilities or drivers need to read the rest of Chapter 2.
- Everyone should read the first several sections of Chapter 3, "Using the System Setup Program," to familiarize themselves with this important program. Only users who want to make configuration changes to their system or who want to use the password features need to read the rest of Chapter 3.
- Users who add or remove an Industry-Standard Architecture (ISA) expansion card should read Chapter 4, "Using the ISA Configuration Utility."
- Users who want to connect their system to a network should read Chapter 5, "Using the Network Interface Controller." This chapter provides information on connecting the system to a network, configuring the optional network interface controller (NIC), and installing drivers for the NIC.
- Users who need information on the integrated sound features of the computer system should read Chapter 6, "Using the Integrated Audio Controller." Chapter 6 provides information on connecting audio equipment to your computer, installing audio drivers, and reconfiguring the integrated audio controller.
- Chapter 7, "Using the Integrated SCSI Controllers," describes the system's SCSI controllers and provides information on how to install SCSI drivers.
- Chapter 8, "Working Inside Your Computer," Chapter 9, "Installing System Board Options," and Chapter 10, "Installing Drives," are intended for users who want to install or remove options inside the computer, such as dual in-line memory modules (DIMMs), expansion cards, or drives.

- Appendix A, "Technical Specifications," and Appendix B, "Hardware Configuration Features," are intended primarily as reference material for users interested in learning more about the details of the system. Users who add internal options may need to refer to Appendix B to change jumper or switch settings.
- Appendix C, "ISA Configuration Utility Messages," describes error messages generated by the ISA Configuration Utility (ICU), possible causes, and corrective actions.
- Appendix D, "Maintaining the System," describes preventive maintenance procedures that you should perform regularly to keep your computer system in top operating condition.
- Appendix E, "Regulatory Notices," is for users who are interested in which regulatory agencies have tested and approved the Dell Precision 610 mini tower systems.
- Appendix F, "Warranties and Return Policy," describes the warranty for your Dell system and the "Total Satisfaction" Return Policy.
- The Glossary provides definitions of terms, acronyms, and abbreviations used in this guide.

Warranty and Return Policy Information

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. For information about the Dell warranty for your system, see Appendix F, "Warranties and Return Policy."

Other Documents You May Need

Besides this *User's Guide*, the following documentation is included with your system:

- The *Getting Started* sheet provides step-by-step instructions for setting up your computer system.
- The *Diagnostics and Troubleshooting Guide* includes troubleshooting procedures and instructions for using the Dell Diagnostics to test your computer system.
- Video card documentation from the card manufacturer describes the video card and video drivers included with the system. Refer to this documentation for information about configuring and optimizing your video subsystem.

You may also have one or more of the following documents.

NOTE: Documentation updates are sometimes included with your system to describe changes to your system or software. Always read these updates ***before*** *consulting any other documentation because the updates often contain the latest information.*

- Operating system documentation is included if you ordered your operating system software from Dell. This documentation describes how to install (if necessary), configure, and use your operating system software.

- Documentation is included with any options you purchase separately from your system. This documentation includes information that you need to configure and install these options in your Dell computer. Installation instructions for the options are included in this *User's Guide* or in the documentation that came with the options.
- Technical information files—sometimes called "readme" files—may be installed on your hard-disk drive to provide last-minute updates about technical changes to your system or advanced technical reference material intended for experienced users or technicians.

Notational Conventions

The following subsections describe notational conventions used in this document.

Warnings, Cautions, and Notes

Throughout this guide, there may be blocks of text printed in bold or italic type. These blocks are warnings, cautions, and notes, and they are used as follows:

WARNING: A WARNING indicates the potential for bodily harm and tells you how to avoid the problem.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

NOTE: A NOTE indicates important information that helps you make better use of your computer system.

Typographical Conventions

The following list defines (where appropriate) and illustrates typographical conventions used as visual cues for specific elements of text throughout this document:

- *Keycaps*, the labeling that appears on the keys on a keyboard, are enclosed in angle brackets.

  Example: <Enter>

- *Key combinations* are series of keys to be pressed simultaneously (unless otherwise indicated) to perform a single function.

  Example: <Ctrl><Alt><Enter>

- *Commands* presented in lowercase bold are for reference purposes only and are not intended to be typed when referenced.

  Example: "Use the **format** command to . . . ."

  In contrast, commands presented in the Courier New font are part of an instruction and intended to be typed.

  Example: "Type `format a:` to format the diskette in drive A."

- *Filenames* and *directory names* are presented in lowercase bold.

  Examples: **autoexec.bat** and **c:\windows**

- *Syntax lines* consist of a command and all its possible parameters. Commands are displayed in lowercase bold; variable parameters (those for which you substitute a value) are displayed in lowercase italics; constant parameters are displayed in lowercase bold. The brackets indicate items that are optional.

  Example: **del** [*drive***:**] [*path*] *filename* [**/p**]

- *Command lines* consist of a command and may include one or more of the command's possible parameters. Command lines are presented in the Courier New font.

  Example: `del c:\myfile.doc`

- *Screen text* is text that appears on the screen of your monitor or display. It can be a system message, for example, or it can be text that you are instructed to type as part of a command (referred to as a *command line*). Screen text is presented in the Courier New font.

  Example: The following message appears on your screen:

  ```
  No boot device available
  ```

  Example: "Type `md c:\dos` and press <Enter>."

- *Variables* are placeholders for which you substitute a value. They are presented in italics.

  Example: DIMM*x* (where *x* represents the DIMM socket designation)

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CHAPTER 1
Introduction

Dell Precision™ 610 systems are high-speed, upgradable workstations designed around Intel® Pentium® II Xeon™ processors. These Dell® systems support the high-performance Peripheral Component Interconnect (PCI) bus and the accelerated graphics port (AGP) bus. Each system also has an Industry-Standard Architecture (ISA) design with one ISA slot that allows you to configure the computer system to your initial requirements and then upgrade it as necessary.

This chapter describes the major hardware and software features of the system and provides information you will need to reinstall the operating system, if necessary. It also provides information about the indicators and controls on the computer's front panel and discusses connecting external devices to the computer.

System Features

The system offers the following features:

- An Intel Pentium II Xeon processor. The following processor option is available:
  - — Single or dual Intel Pentium II Xeon processor(s) with an internal speed of 400 MHz and an external speed of 100 MHz

  The Intel Pentium II Xeon processor includes MMX™ technology designed to handle complex multimedia and communications software. This processor incorporates new instructions and data types as well as a technique called single instruction, multiple data (SIMD). SIMD allows the processor to process multiple data elements in parallel, thereby improving system performance when you are running application programs written to take advantage of MMX technology.

  The Intel Pentium II Xeon processor has a 16-kilobyte (KB) internal data cache and a 16-KB internal instruction cache, an internal math coprocessor, and other advanced internal logic.

- A secondary cache of 512 KB or 1 megabyte (MB) of static random-access memory (SRAM) integrated in the Slot 2 single-edge contact (Slot 2 SEC) cartridge. The secondary cache also provides error checking and correction (ECC) capability.
- Dual-processor capability. The system allows the installation of a second Slot 2 SEC cartridge (operating at the same frequency as the installed processor), which can be purchased as a kit from Dell. Dual processing improves performance

under operating systems that support multiprocessing, such as Microsoft® Windows NT® 4.0.

- A 16-bit, integrated Plug and Play Crystal CS4237B audio controller that is Sound Blaster Pro-compatible and that supports the Microsoft Windows® Sound System. See Chapter 6, "Using the Integrated Audio Controller," for details.
- System memory that can be increased incrementally up to 512 MB using unbuffered synchronous dynamic random-access memory (SDRAM) dual in-line memory modules (DIMMs), or up to 2048 MB using registered SDRAM DIMMS.

  The memory subsystem also provides ECC capability, which corrects all single-bit memory errors and detects all multibit errors. See "Adding Memory" in Chapter 9 for details on installing additional memory.

- Self-Monitoring Analysis and Reporting Technology (SMART) support, which warns you at system start-up if the hard-disk drive has become unreliable. To take advantage of this technology, you must have a SMART-compliant hard-disk drive in the computer. All enhanced integrated drive electronics (EIDE) and small computer system interface (SCSI) hard-disk drives shipped with Dell Precision 610 systems are SMART-compliant.
- The system's basic input/output system (BIOS), which resides in flash memory and can be upgraded remotely or by diskette if required.
- Plug and Play capability, which greatly simplifies the installation of expansion cards. Plug and Play support included in the system BIOS allows you to install a Plug and Play expansion card without setting jumpers or switches or performing other configuration tasks. The ISA Configuration Utility (ICU) allows you to configure an existing ISA expansion card for conflict-free operation. Also, because the system BIOS is stored in flash memory, it can be updated to support future enhancements to the Plug and Play standard.

NOTE: The Windows NT operating system does not provide ISA Plug and Play support. Therefore, some ISA Plug and Play cards (such as modem, sound, and network cards) may not work with your Windows NT operating system unless you configure them manually.

- Wakeup On LAN capability, which, when enabled in the System Setup program, allows the system to be started up from a server management console. Wakeup On LAN capability also allows remote computer setup, BIOS upgrades, software downloading and installation, file updates, and asset tracking after hours and on weekends when local area network (LAN) traffic is at a minimum.
- Universal Serial Bus (USB) capability, which simplifies connection of peripheral devices such as mice, printers, and computer speakers. The USB connectors on the computer's back panel provide a single connection point for multiple USB-compliant devices. USB-compliant devices can also be connected and disconnected while the system is running.

CAUTION: Do not attach a USB device or a combination of USB devices that draw a maximum current over 500 milliamperes (mA) per channel or +5 volts (V). Attaching devices that exceed this threshold may cause the USB ports to shut down. See the documentation that accompanied the USB devices for their maximum current ratings.

- A modular computer chassis with a minimum number of screws for easy disassembly and improved serviceability.
- A high-speed, high-resolution AGP or PCI graphics adapter. (Documentation from the graphics adapter manufacturer is included with the system.) AGP greatly improves graphics performance by providing a dedicated bus for a faster interface between the video subsystem and system memory. AGP also allows conventional memory to be used for video-related tasks.

The system board includes the following integrated features:

- Five 32-bit PCI expansion slots, including one that is a shared PCI (32-bit)/ISA (16-bit) expansion slot and one that has an extension for a redundant array of inexpensive disks (RAID) upgrade.
- One AGP expansion slot.
- A diskette drive interface, which supports a 3.5-inch slimline diskette drive.
- Two ATA-33 channels that support up to four EIDE devices. The primary and secondary channels utilize the PCI bus to provide faster data throughput. Each channel supports extremely high-capacity EIDE drives, as well as devices such as EIDE CD-ROM drives and EIDE tape drives.
- SCSI support using two integrated SCSI channels.
  - The primary channel provides Ultra2/Wide low voltage differential (LVD) (80-MB/second) support for high-performance SCSI hard-disk drives and an optional RAID subsystem.
  - The secondary channel provides support for external Ultra/Wide (40-MB/second) SCSI devices such as scanners and for internal narrow SCSI devices such as CD-ROM drives, tape drives, and optical drives.
- Two high-performance serial ports and one bidirectional parallel port for connecting external devices.
- A Personal System/2 (PS/2)-style keyboard port and a PS/2-compatible mouse port.
- An integrated 10/100-megabit-per-second (Mbps) 3Com® PCI 3C905b-TX Ethernet network interface controller (NIC) with Wakeup On LAN support. The NIC is configured using software described in Chapter 5, "Using the Network Interface Controller."

The following software is included with your Dell computer system:

- Utilities that safeguard the system and enhance the operation of its hardware features; for example, the AutoShutdown service lets you perform an orderly shutdown with a single touch of the power button. For more information on these utilities, see Chapter 2, "Using the Software Support Utilities."

- Video drivers for the Microsoft Windows NT 4.0 operating system.

NOTE: Some graphics adapters support the Windows NT 4.0 operating system only. Refer to the documentation that came with your graphics adapter for more information.

To change the resolution, check the documentation that came with your monitor to determine the resolutions and refresh rates supported by the monitor. Then check the documentation that came with your AGP or PCI graphics adapter for instructions on changing the resolution.

- The System Setup program for quickly viewing and changing the system configuration information. For more information on this program, see Chapter 3, "Using the System Setup Program."
- Enhanced security features available through the System Setup program (a setup password, a system password, a system password lock option, a write-protect option for diskette drives, and automatic display of the system's service tag number). In addition, a customer-definable asset tag number can be assigned via a software support utility and viewed on the System Setup screens. A built-in chassis intrusion detector is also available. For more information, see Chapter 2, "Using the Software Support Utilities," and Chapter 3, "Using the System Setup Program."
- Advanced power management options that can reduce the energy consumption of the system. For more information, see Chapter 3, "Using the System Setup Program."
- The ICU, which allows you to configure ISA expansion cards manually. After resources have been assigned to these cards, the system BIOS can assign resources to PCI and Plug and Play expansion cards for a conflict-free configuration. For more information, see Chapter 4, "Using the ISA Configuration Utility."
- Dell Diagnostics for evaluating the computer's components and devices. For information on using the diagnostics, see the chapter titled "Running the Dell Diagnostics" in the *Diagnostics and Troubleshooting Guide*.
- Network device drivers for several network operating systems. These drivers are described in Chapter 5, "Using the Network Interface Controller."
- Desktop Management Interface (DMI) support for managing the computer system. DMI defines the software, interfaces, and data files that enable the system to determine and report information about system components.

  If the system has a Dell-installed Microsoft Windows or Microsoft Windows NT operating system, DMI is already installed on the system's hard-disk drive. To learn more about DMI, double-click the Dell DMI Help icon in the Dell DMI folder under the Start button.

- Advanced Configuration and Power Interface (ACPI) for operating systems that support ACPI functionality.
- The Dell OpenManage™ Client Administrator/Client program, which is available in administrator and client versions.

  Dell OpenManage Client Administrator is the Dell software-management application interface for DMI. Dell OpenManage Administrator is designed for network

administrators to remotely manage connected Dell Precision 610 systems in a Dell DMI client network.

Features of Dell OpenManage Client Administrator include:

— Compliance with the DMI 2.0 specification

— Support for the Microsoft Windows NT 4.0 operating system

— Remote Flash BIOS support that enables you to perform BIOS updates on remote systems in a Dell DMI client network

— Wakeup On LAN support that allows you to remotely turn on Dell systems with Wakeup On LAN capabilities in a Dell DMI client network

— Password security that allows you to maintain standard attribute values and hardware configuration settings for the local and remote systems in a Dell DMI client network

— A System Properties window that allows you to view, set, and disable certain hardware configuration settings for the local and remote systems in a Dell DMI client network

— An Alert Settings window that enables you to monitor remote systems, set thresholds, and detect events for the local system or remote system in a Dell DMI client network

— Support for the Microsoft Systems Management Server (SMS), which allows you to export one or more groups to an SMS directory that the SMS administrator can access

— Automated mapping of one or more groups to a user-defined directory

— A LAN Adapter component that lists information about the NIC for the local or remote system

— A Dell event log that stores events generated by Dell systems

— Automated inventory control for all active discovered systems

— Support for the application used to create user-definable attributes (UDAs)

Dell OpenManage Client is the Dell software-management application interface for DMI. Dell OpenManage Client is designed for local systems in a Dell DMI client network and includes the following features:

— Compliance with the DMI 2.0 specification

— Support for the Microsoft Windows NT 4.0 operating system

— Support to view and modify a local system's hardware configuration settings

— Support for the Microsoft SMS, which allows you to export one or more groups to an SMS directory that the SMS administrator can access

— Automated mapping of one or more groups to a user-defined directory

— A LAN Adapter component that lists detailed information about the NIC for the local system

— An event log that stores events generated by the system

— Support for the application used to create UDAs

If you ordered Dell-installed software, such as the Microsoft Windows NT operating system, Dell provides a menu that allows you to make program diskette sets of the Dell-installed software. A *program diskette set* is an uninstalled version of a software package that you can use to reinstall or reconfigure the software. You can use this same menu to remove *diskette image files* (individual files that correspond to each diskette in a program diskette set) to reclaim space on the computer's hard-disk drive. For more information on making program diskette sets, see the online help provided in the Program Diskette Maker, which is available in the Dell Accessories program folder.

Important Note to Windows NT 4.0 Users

Your system was configured by Dell to optimize the features of your computer and of the Microsoft Windows NT 4.0 operating system. If you need to reinstall this operating system, there are several supplemental items that also must be installed to return the system to its full functionality. See the appropriate subsection that follows for your operating system.

Reinstalling Windows NT 4.0

To reinstall the Windows NT 4.0 operating system, you must have the following items:

- Windows NT 4.0 CD from Dell
- Windows NT 4.0 SCSI controller driver diskettes
- Windows NT 4.0 Service Pack 3 CD
- Windows NT 4.0 Microsoft updated ATAPI driver diskette
- Windows NT 4.0 video driver diskettes
- Windows NT 4.0 NIC driver diskette
- Windows NT 4.0 audio driver diskette

NOTE: You must create all the diskettes listed previously by using the Program Diskette Maker, which is located in the Dell Accessories folder.

CAUTION: When reinstalling Windows NT 4.0, you must exit the installation process by pressing <F6> when the system displays the message `Setup is inspecting your hardware configuration`. Then you must install the SCSI controller drivers as described in Chapter 7, "Using the Integrated SCSI Controllers," and then proceed with installing the other supplemental

items. If you do not interrupt the installation procedure, the system will misidentify the primary SCSI controller as being the same as the secondary SCSI controller and lock up.

*NOTE: You **must** install Windows NT 4.0 Service Pack 3 and the Microsoft updated ATAPI driver **before** installing the NIC drivers. Otherwise, the integrated NIC will not function properly.*

See the *Dell Microsoft Windows NT Workstation 4.0 Setup Guide* for general installation information for Windows NT 4.0 and for information about other drivers or supplements that may be required. For installation instructions for the various drivers, see the appropriate section or document as follows:

- Windows NT 4.0 SCSI controller drivers — See "SCSI Drivers for Windows NT 4.0" in Chapter 7.
- Windows NT 4.0 Microsoft updated ATAPI driver — See "Microsoft Updated ATAPI Drivers" in Chapter 2.
- Windows NT 4.0 video drivers — See the documentation for your graphics adapter.
- Windows NT 4.0 NIC driver — See "Windows NT 4.0 NIC Driver" in Chapter 5.
- Windows NT 4.0 audio drivers — See "Audio Drivers for Windows NT 4.0" in Chapter 6.

Creating Disk Partitions for Windows NT 4.0

After you have completed the setup procedure for the Dell-installed Microsoft Windows NT 4.0 operating system, you can perform the following procedure to create disk partitions on your large-capacity hard-disk drive(s):

1. **Click the Start button, point to Programs, and click Administrative Tools.**
2. **Click Disk Administrator.**

   Follow the instructions in the Disk Administrator utility to partition and format your drives.

Front Panel

The computer's front panel contains the following indicators and controls (see Figure 1-1):

- The *power button* provides control of the system's alternating current (AC) input power. The push-button switch operates as follows:
  - — When the computer is turned off, pressing the button turns the computer on.
  - — When the computer is turned on, pressing the button turns the computer off. However, a low-voltage (standby) current is maintained by the power supply.

To completely remove all power from the system, unplug the AC power cable from its source.

For systems running Microsoft Windows NT with the Dell AutoShutdown service operational, pressing the power button causes the system to perform an orderly operating system shutdown before turning off. (For more information, see "Dell AutoShutdown Service" in Chapter 2.)

NOTE: A Display Power Management Signaling (DPMS) monitor does not begin warming up until the computer to which it is attached is turned on. Thus, some DPMS monitors may not display a video image until several seconds after you turn on the computer.

- The *power indicator* light is green during normal system operation and amber when the computer is in sleep mode.
- The *hard-disk drive access indicator* lights up when a hard-disk drive is in use. (Drive access indicators for diskette drives and tape drives are located on the front of the drives.)
- The *reset button* reboots (restarts) the system without your having to turn the power off and then on again. Rebooting the system in this manner reduces stress on system components.

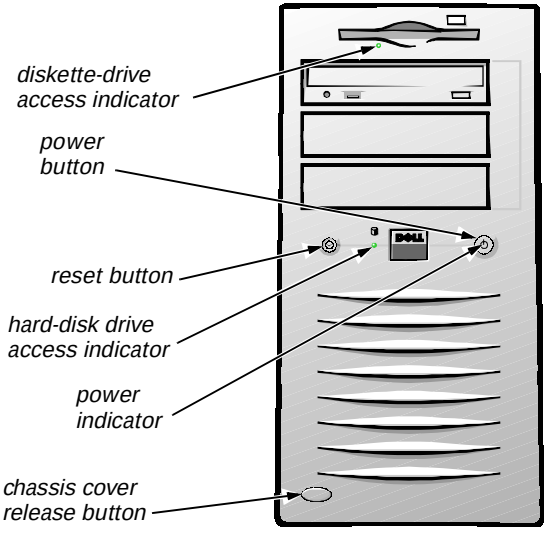


Figure 1-1. Front Panel

Back Panel

The computer's back panel contains various ports and connectors for attaching external devices and includes a security cable slot. These features are described in the following subsections.

For information about enabling, disabling, or configuring input/output (I/O) ports and connectors, see Chapter 3, "Using the System Setup Program." For detailed descriptions and illustrations of each port and connector on the back panel, see "I/O Ports and Connectors" in Appendix B.

Connecting External Devices

You can connect various external devices, such as a mouse and printer, to the I/O ports and connectors on the computer's back panel. The system BIOS detects the presence of most external devices when you boot or reboot the system. When connecting external devices to the computer, follow these guidelines:

- Check the documentation that accompanied the device for specific installation and configuration instructions.

  For example, most devices must be connected to a particular I/O port or connector to operate properly. Also, external devices like a mouse or printer usually require you to load software files called *device drivers* into system memory before they will work. These software drivers help the computer recognize the external device and direct its operation.

- Dell recommends that you attach external devices *only while the computer is turned off* unless you are instructed otherwise in the documentation for the particular device. Then turn the computer on before turning on any external devices unless the documentation for the device specifies otherwise. (If the computer does not seem to recognize the device, try turning on the device before turning on the computer.)

CAUTION: When disconnecting external devices from the back of the computer, wait 10 to 20 seconds after disconnecting the computer from AC power before you disconnect the device to avoid possible damage to the system board.

Security Cable Slot and Padlock Ring

On the back of the computer are a security cable slot and padlock ring (see Figure 1-2) for attaching commercially available antitheft devices. Security cables for personal computers usually include a segment of galvanized cable with an attached locking device and key. To prevent unauthorized removal of the computer, loop the cable around an immovable object, insert the locking device into the security cable slot on the back of the computer, and lock the device with the key provided. Complete instructions for installing this kind of antitheft device are usually included with the device.

NOTE: Antitheft devices are of differing designs. Before purchasing such a device, make sure it will work with the cable slot on the computer.

The padlock ring allows you to secure the computer cover to the chassis to prevent unauthorized access to the inside of the computer. To use the padlock ring, insert a commercially available padlock through the ring and then lock the padlock.

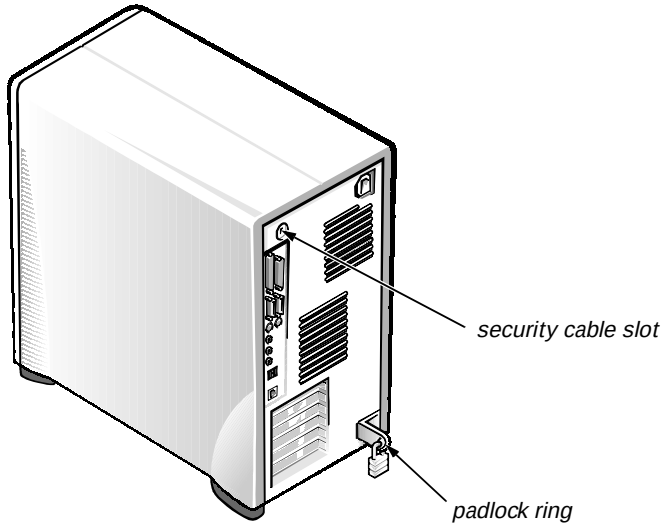


Figure 1-2. Security Cable Slot and Padlock Ring

Getting Help

If at any time you don't understand a procedure described in this guide or if the system does not perform as expected, Dell provides a number of tools to help you. For more information on these help tools, see the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide.*

CHAPTER 2
Using the Software Support Utilities

Your Dell system comes with software support utilities on diskette or on your computer's hard-disk drive. These software support utilities include system utilities, system services, and Microsoft updated ATAPI drivers, all of which are documented in this chapter.

For information on the additional software support utilities you received with your system, refer to the following chapters or documents:

- Video drivers — See the documentation from the graphic adapter manufacturer. (Video drivers support the video graphics requirements of a variety of monitors and application programs running under the Microsoft Windows NT 4.0 operating system.)

  NOTE: Some graphic adapters support the Windows NT 4.0 operating system only. Refer to the documentation that came with your graphic adapter for more information.

- Audio drivers — See Chapter 6, "Using the Integrated Audio Controller."
- Network interface drivers — See Chapter 5, "Using the Network Interface Controller."
- SCSI interface drivers — See Chapter 7, "Using the Integrated SCSI Controllers."

System utilities and services can be used to safeguard your system and to explicitly control certain hardware features. Refer to "System Utilities and Services" found later in this chapter for information about these utilities.

Microsoft updated ATAPI drivers are provided with your Dell system for the Windows NT 4.0 operating system. Refer to "Microsoft Updated ATAPI Drivers" found later in this chapter for information about these drivers.

Dell-Installed Software Support Utilities

The system utilities, services, and Microsoft updated ATAPI drivers are already installed on your hard-disk drive in two different forms: as working utilities, operative immediately, and as diskette images.

In case you later need to reinstall the files for any reason, you need to copy the diskette images to a backup diskette (see the next section, "Backing Up the Software Support Utilities"). From the backup diskette, you can install the desired file(s) to a directory on your hard-disk drive. Further instructions for installing the utilities, services, and drivers are provided later in this chapter.

Backing Up the Software Support Utilities

Dell recommends that you create original diskette copies, or *program diskette sets*, of your Dell-installed software. You will need these diskettes if you ever want to reconfigure or reinstall your Dell-installed software. To create program diskettes, use the Program Diskette Maker (available through the Dell Accessories program folder).

Software Support Utilities on Diskette

If you received Dell software support diskettes, the Dell system utilities, services, and Microsoft updated ATAPI drivers are provided on these diskettes. To use a utility, service, or Microsoft updated ATAPI driver, you must install the utility, service, or driver as described later in this chapter.

NOTE: On each software support diskette set you receive, a **release.txt** *file may be included (on diskette 1 of the set). If included, the* **release.txt** *file contains the latest updates to the information in this guide. Use the editor included with your operating system to view and/or print the contents of the* **release.txt** *file.*

System Utilities and Services

The following utilities and services are included on your Dell system utilities diskette**:**

- The *Asset Tag* utility lets you enter a system asset tag number into nonvolatile random-access memory (NVRAM). Thereafter, you can display this number using the Asset Tag utility or the System Setup program.
- The *Dell AutoShutdown* service provides Windows NT 4.0 the ability to perform an orderly system shutdown when the power button is pressed.
- The *Dell ThermalShutdown* service provides Windows NT 4.0 the ability to perform an orderly system shutdown in the event of a thermal failure. This feature prevents permanent damage to your system caused by a component overheating.
- The *Auto Power On* utility (which runs under the MS-DOS® operating system only) reports what caused the system to power on, such as the power switch or a call from the Auto Power On utility itself. This utility also enables you to create a batch file to carry out a series of commands when your system is powered on by the Auto Power On feature or by the power switch.

Reinstalling the Dell System Utilities and Services for Windows NT 4.0

The system utilities and services are already installed and operative on your hard-disk drive. If, for any reason, you need to reinstall the utilities and services, perform the following steps:

1. **If you have not already done so, use the Program Diskette Maker to make a diskette copy of the Dell system utilities diskette image on your hard-disk drive.**

   The Program Diskette Maker is available through the Dell Accessories program folder. For more information, refer to the online help provided in the Program Diskette Maker.

2. **Start Windows NT and log in as Administrator or as a user with administrative privileges. If you are already running Windows NT, close any open documents or application programs.**

3. **With the backup diskette in drive A, run the** setup.exe **program from the diskette.**

4. **Follow the on-screen instructions to install the Dell utilities and/or services. When the installation is finished, restart your system to activate the services.**

5. **Verify that the utilities and/or service(s) are installed and running.**

   Double-click the Services icon in the Control Panel. AutoShutdown and ThermalShutdown should be listed with the status of Started.

   The Asset Tag utility and Auto Power On utility (if installed) are located in the **c:\dellutil** directory on the drive containing the Windows NT 4.0 system files.

Removing a Service

To remove a service, perform the following steps:

1. **Insert the backup diskette in drive A.**

2. **Run** remove.exe **from the diskette.**

3. **Select the service(s) you want to remove and click Next.**

Asset Tag Utility

The Asset Tag utility allows you to enter an asset tag number for the computer. The default System Setup screens (see Figure 3-1) do not show the asset tag number unless you enter one using this utility.

NOTE: The Asset Tag utility does not function correctly under Windows NT. However, you may be able to run the utility in Windows NT by booting from a DOS diskette or diagnostics diskette, exiting to the DOS prompt, and then entering the **asset** *command on the DOS command line.*

You can use the Asset Tag utility to enter an asset tag number that you or your company assign to the computer; you can also use it to reenter the computer's service tag number if that becomes necessary.

Use the **asset** command from an MS-DOS prompt. To view existing asset tag and service tag numbers, type `asset` and press <Enter>. (You can also view the asset tag number by using the System Setup program described in Chapter 3.) To display the Asset Tag utility help screen, type `asset /?` and press <Enter>.

Assigning and Deleting an Asset Tag Number

An asset tag number can have up to ten characters; any combination of characters excluding spaces is valid. To assign or change an asset tag number, type `asset` and a space followed by the new number; then press <Enter>. For example, type the following command line and press <Enter>:

```
asset 1234$ABCD&
```

When prompted to verify the asset tag number, type y and press <Enter>. The system then displays the new or modified asset tag number and the service tag number.

To delete the asset tag number without assigning a new one, type `asset /d` and press <Enter>.

Assigning and Deleting an Owner Tag

You can use the Asset Tag Utility to assign an owner tag that will be displayed on the Dell logo screen whenever you boot your system.

An owner tag can be up to 80 characters; any combination of letters, numbers, and spaces is valid. To assign an owner tag, type `asset /o` and a space followed by the new owner tag; then press <Enter>. For example, type the following command line and press <Enter>:

```
asset /o ABC Company
```

When prompted to verify the owner tag, type y and press <Enter>. The system then displays the new owner tag.

To delete the owner tag without assigning a new one, type `asset /o /d` and press <Enter>.

Dell AutoShutdown Service

The Dell AutoShutdown service (available with the Windows NT 4.0 operating systems) provides the ability to perform an orderly system shutdown when the power button is pressed.

How AutoShutdown Works

The power button operates in two modes: immediate and AutoShutdown mode.

When the system is off, the power button always acts in immediate mode—that is, when the button is pressed, the system starts up immediately.

When the system is on and the AutoShutdown service is installed, the power button operates in AutoShutdown mode. Pressing the power button signals the service to perform an orderly operating system shutdown (reducing the possibility of data loss and file corruption) before removing power from the system. During the shutdown sequence, the power indicator on the front panel of the computer flashes.

NOTE: The presence of the AutoShutdown service does not affect the operation of the system reset button.

If Your Operating System Locks Up

If, when you press the power button, the power indicator begins to flash but the system does not turn off, your operating system may have locked up. (A locked-up operating system cannot perform a safe shutdown.)

To ensure that the system can be turned off under these circumstances, a manual intervention mechanism has been included in the software. To turn off a locked-up system, either press the power button a second time or press the reset button.

Dell ThermalShutdown Service

The Dell ThermalShutdown service helps protect components such as the system processor and the primary hard-disk drive from damage due to overheating. It can also protect your system data from loss or corruption resulting from a thermal-related system shutdown.

When installed, the service uses sensors to monitor the temperature of critical internal components. If a sensor detects a thermal event, the system first performs an orderly operating system shutdown and then turns itself off. During the shutdown phase, the power indicator flashes and a screen message notifies the user that the system is shutting down.

If the ThermalShutdown service is unable to shut down the system, the system will be shut down if Thermal Power-off is enabled in the System Setup program. (See "Thermal Power-Off" in Chapter 3 for more information.)

CAUTION: The thermal sensors are always installed and operational. If the ThermalShutdown service is *not* installed and a thermal event occurs, the system turns off after approximately 3 minutes if Thermal Power-off is enabled in the System Setup program.

Auto Power On Utility

The Auto Power On utility (available for MS-DOS only) enables your system to automatically perform routine tasks in your absence. For example, you might want your system to turn on at night and perform a backup procedure. To use the utility, you need to create a batch file containing the command(s) or program(s) that you want performed in your absence. The Auto Power On utility determines whether system power was turned on by the power button or by the Auto Power On setting in the System Setup program and passes this information on to your batch file, which initiates the appropriate commands at system start-up. See "Auto Power On" in Chapter 3 for information on setting Auto Power On in the System Setup program.

The following example shows the contents of a possible batch file.

*NOTE: The first three lines of your batch file **must** match the first three lines in the following example.*

```
autopowr
if errorlevel 2 goto alarm
if errorlevel 1 goto button

:alarm
call alarm.bat
autopowr /off

:button
call button.bat
goto end
```

The **autopowr /off** command turns off your computer.

Installing the Auto Power On Utility

The Auto Power On utility is already installed on your hard-disk drive. If you need to reinstall the Auto Power On utility, perform the following steps:

1. **If you have not already done so, use the Program Diskette Maker to make a diskette copy of the *Dell System Utilities* diskette image on your hard-disk drive.**

   The Program Diskette Maker is available through the Dell Accessories program folder. For more information, refer to the online help provided in the Program Diskette Maker.

2. **With the backup diskette in drive A, copy** autopowr.com **from the diskette to a directory of your choice on your hard-disk drive.**

If the **path** statement in your **autoexec.bat** file does not already contain the directory in which you reinstalled the Auto Power On utility, modify the **path** statement to include that directory. (See your MS-DOS reference documentation for information on modifying the **autoexec.bat** file.)

Microsoft Updated ATAPI Drivers

Microsoft updated ATAPI drivers (provided for Windows NT 4.0 operating system) offer a performance improvement by off-loading certain functions from the system processor during multithreaded operations. Dell has installed the Microsoft updated ATAPI driver for your operating system, and it is operative when you receive your computer. No further installation or configuration is needed.

NOTE: If Windows NT 4.0 is reinstalled, the Microsoft updated ATAPI drivers must also be reinstalled.

The driver for Windows NT 4.0 has also been copied to your hard-disk drive in diskette-image form. If you need to reinstall or remove this driver, you can do so as described in the following subsections.

Reinstalling the Windows NT 4.0 Microsoft Updated ATAPI Driver

NOTE: To install the Microsoft updated ATAPI driver for Windows NT 4.0, you must have a mouse connected to the system and Windows NT 4.0 must already be installed on the hard-disk drive connected to the primary EIDE channel.

To reinstall the Microsoft updated ATAPI driver for Windows NT 4.0, perform the following steps:

1. **If you have not already done so, use the Program Diskette Maker to make a diskette copy of the Dell Microsoft updated ATAPI driver diskette image on your hard-disk drive.**

   The Program Diskette Maker is available through the Dell Accessories program folder. For more information, refer to the online help provided in the Program Diskette Maker.

2. **Start the Windows NT operating system. If you are already running Windows NT, close any open documents or application programs.**

3. **Insert the Microsoft updated ATAPI driver diskette in drive A.**

4. **Click the Start button.**

5. **Click Run, type** `a:\setup.bat` **in the Run window, and then click OK.**

   A black screen will quickly appear and disappear, which indicates that the driver file has been loaded. Setup automatically saves the existing **atapi.sys** driver as **atapi.000** and loads the new driver into the **system32\drivers** subdirectory in the Windows NT directory.

6. **Remove the diskette from drive A. Then restart the computer.**

NOTE: To enable or disable direct memory access (DMA) while using the Microsoft updated ATAPI driver, run ***dmacheck.exe*** *from* ***\support\utils\i386*** *on the* Microsoft Windows NT Service Pack 3 *CD-ROM.*

Removing the Windows NT 4.0 Microsoft Updated ATAPI Driver

To remove the Microsoft updated ATAPI driver, follow these steps:

1. **Start the Windows NT operating system. If you are already running Windows NT, close any open documents or application programs.**
2. **Use Explorer to open the** system32\drivers **subdirectory in the Windows NT directory.**
3. **Rename the existing** atapi.sys **file to** atapi.bak**.**
4. **Rename the** atapi.000 **file to** atapi.sys**.**
5. **Restart the computer.**

CHAPTER 3
Using the System Setup Program

Each time you turn on your computer system or press the reset button, the system compares the hardware installed in the system to the hardware listed in the system configuration information stored in nonvolatile random-access memory (NVRAM) on the system board. If the system detects a discrepancy, it generates error messages that identify the incorrect configuration settings. The system then prompts you to enter the System Setup program to correct the setting.

You can use the System Setup program as follows:

- To change the system configuration information after you add, change, or remove any hardware in your system
- To set or change user-selectable options—for example, the time or date on your system
- To enable or disable all integrated devices in your system

You can *view* the current settings at any time. When you *change* a setting, in many cases, you must reboot the system before the change takes effect.

After you set up your system, run the System Setup program to familiarize yourself with your system configuration information and optional settings. For future reference, Dell recommends that you print the System Setup screen (by pressing the <Print Screen> key) if you have a local printer installed, or write down the information if you do not have a printer.

Before you use the System Setup program, you need to know the kind of diskette drive(s) and hard-disk drive(s) installed in your computer. If you are unsure of any of this information, see the Manufacturing Test Report that was shipped with your system and is located in the Dell Accessories folder.

Entering the System Setup Program

Enter the System Setup program as follows:

1. **Turn on your system.**

   If your system is already on, shut it down and then turn it on again.

2. **When the Press <F2> to Enter Setup window appears in the upper-right corner of the screen, press <F2>.**

If you wait too long and your operating system begins to load into memory, *let the system complete the load operation*; then shut down the system and try again.

NOTE: To ensure an orderly system shutdown, consult the documentation that accompanied your operating system.

You can also enter the System Setup program by responding to certain error messages. See "Responding to Error Messages" at the end of this chapter.

System Setup Screen

The System Setup screen displays the current setup and configuration information and optional settings for your system. (Typical examples are illustrated in Figure 3-1) Information on the System Setup screen is organized in four areas:

- Title box

  The box at the top of the screen lists the system name.

- System data

  The two boxes below the title box display information about your system, such as the basic input/output system (BIOS) revision number.

- Configuration options

  The box under the system data boxes lists options that define the installed hardware in your computer.

  Fields beside the options contain settings or values; you can change those that appear in white on the screen. You cannot change settings or values that appear in a color highlight because they are determined by the system.

  Some options have multiple fields, which may show settings or values as bright or less bright depending upon the settings or values you entered in other fields.

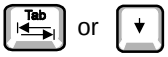
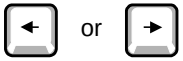
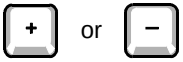
- Key functions

  The line of boxes across the bottom of the screen lists keys and their functions within the System Setup program.

Using the System Setup Program

Table 3-1 lists the keys you use to view or change information on the System Setup screen and to exit the program.

Table 3-1. System-Setup Navigation Keys

Keys	Action
	Moves to the next field.
or	Moves to the previous field.
	Cycles through the settings in a field. In many fields, you can also type the appropriate value.
	Enters the selected field's pop-up settings menu.
	Cycles through the settings in the selected field's pop-up settings menu.
	Saves the selected settings in a field's pop-up settings menu and returns to the main System Setup screen. For a few options (as noted in the help area) the changes take effect immediately. Exits the System Setup program at the System Setup screen if no settings in any option were changed. Provides exit menu options if changes were made. Highlight a menu option to select it and press <Enter> to activate it. • Save Changes and Exit option exits the System Setup program and reboots the system, implementing any changes you have made. • Discard Changes and Exit option exits the System Setup program without rebooting the system and returns the system to its previous state—the boot routine. • Return to Setup option returns to the System Setup screen.
	Resets the selected options to their default settings.
	Displays help information for the selected option.

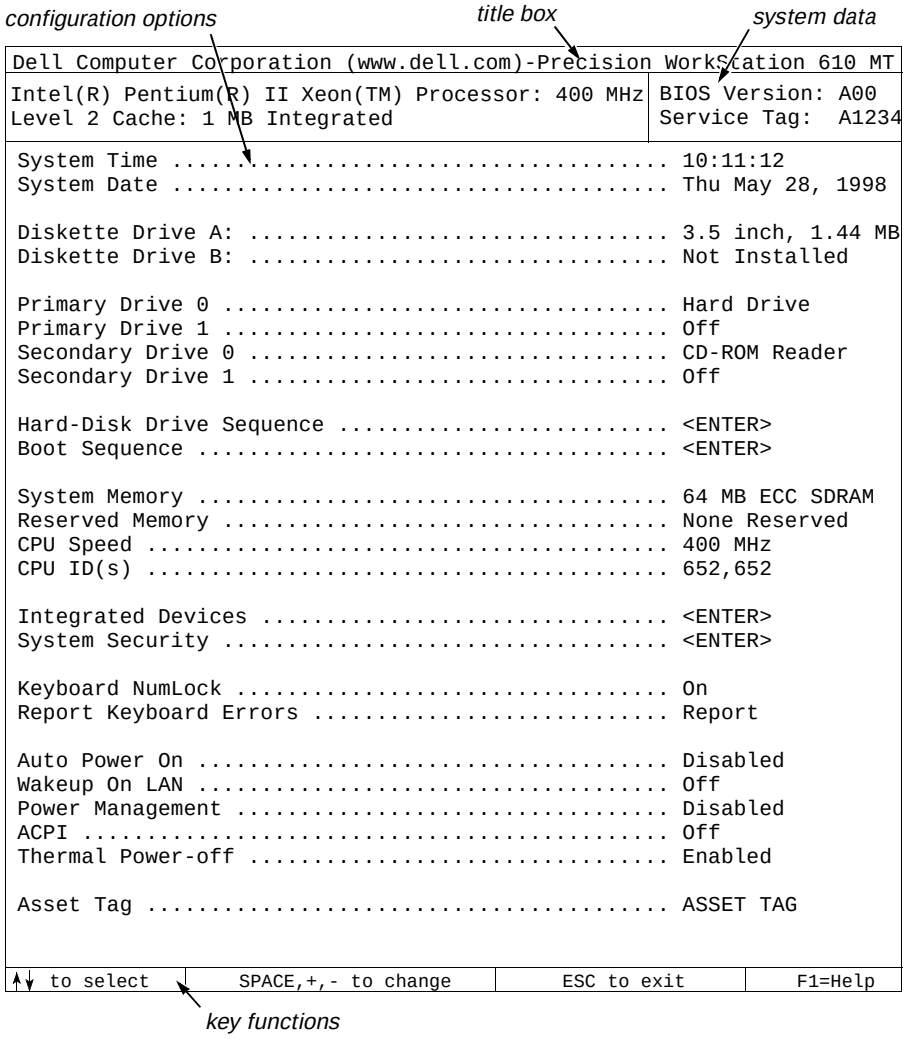

configuration options
title box
system data
Dell Computer Corporation (www.dell.com)-Precision WorkStation 610 MT
Intel(R) Pentium(R) II Xeon(TM) Processor: 400 MHz
Level 2 Cache: 1 MB Integrated
BIOS Version: A00
Service Tag: A1234
System Time 10:11:12
System Date ..... Thu May 28, 1998
Diskette Drive A: ..... 3.5 inch, 1.44 MB
Diskette Drive B: ..... Not Installed
Primary Drive 0 ..... Hard Drive
Primary Drive 1 ..... Off
Secondary Drive 0 ..... CD-ROM Reader
Secondary Drive 1 ..... Off
Hard-Disk Drive Sequence ..... <ENTER>
Boot Sequence ..... <ENTER>
System Memory ..... 64 MB ECC SDRAM
Reserved Memory ..... None Reserved
CPU Speed ..... 400 MHz
CPU ID(s) 652,652
Integrated Devices ..... <ENTER>
System Security ..... <ENTER>
Keyboard NumLock ..... On
Report Keyboard Errors ..... Report
Auto Power On ..... Disabled
Wakeup On LAN ..... Off
Power Management ..... Disabled
ACPI ..... Off
Thermal Power-off ..... Enabled
Asset Tag ..... ASSET TAG
↑↓ to select
SPACE,+,- to change
ESC to exit
F1=Help
key functions

Figure 3-1. Typical System Setup Screen

System Setup Options

The following subsections explain in detail each of the options on the System Setup screen.

System Time

System Time resets the time on the computer's internal clock.

Time is kept in a 24-hour format (*hours*:*minutes*:*seconds*). To change the time, press the left- or right-arrow keys to select a field, and then press <+> or <-> to increase or decrease the number. If you prefer, you can type numbers in each of the fields.

System Date

System Date resets the date on the computer's internal calendar.

Your system automatically displays the day of the week corresponding to the settings in the *month*, *day-of-month*, and *year* fields.

To change the date, press the left- or right-arrow keys to select a field, and then press <+> or <-> to increase or decrease the number. If you prefer, you can type numbers in the *day-of-month* and *year* fields.

Diskette Drive A and Diskette Drive B

Diskette Drive A and Diskette Drive B identify the type(s) of diskette drive(s) installed in your computer. The standard configuration for this system is one 3.5-inch slimline diskette drive installed at the top of the drive cage. This drive is designated Diskette Drive A and is normally the only diskette drive in the computer.

The options always match the physical locations of the drives in your computer—the first drive listed is the top drive in your computer.

The Diskette Drive A and Diskette Drive B options have the following settings:

- 5.25 Inch, 360 KB
- 5.25 Inch, 1.2 MB
- 3.5 Inch, 720 KB
- 3.5 Inch, 1.44 MB
- Not Installed

NOTE: Tape drives are not reflected in the Diskette Drive A and Diskette Drive B settings. For example, if you have a single diskette drive and a tape drive attached to the diskette/tape drive interface cable, set Diskette Drive A to match the characteristics of the diskette drive and set Diskette Drive B to Not Installed.

Primary Drive n and Secondary Drive n

Primary Drive *n* identifies drives attached to the primary enhanced integrated drive electronics (EIDE) interface connector (labeled "IDE1") on the system board; Secondary Drive *n* identifies drives connected to the secondary EIDE interface connector (labeled "IDE2"). Dell recommends that you use the secondary EIDE interface connector for EIDE CD-ROM and EIDE tape drives.

NOTE: For all devices obtained from Dell that use the built-in EIDE controller, set the appropriate Drive option to Auto.

The four Primary Drive *n* and Secondary *n* options identify the type of EIDE devices installed in the computer. For each drive, five parameters can be chosen as a group by drive-type number, entered individually from the keyboard, or set automatically. A *drive-type number* specifies the parameters of a hard-disk drive, based on a table recorded in the system's BIOS.

To choose a setting for each option, press <Enter> to access the field's pop-up settings menu. Then type characters from the keyboard or use the left- or right-arrow key to cycle through the following settings:

- Auto (use this setting for all EIDE devices from Dell)
- Off
- User 1 or User 2
- A specific drive-type number

NOTE: Operating systems that bypass the system BIOS may not obtain optimum hard-disk drive performance.

EIDE Devices

For EIDE hard-disk drives, the system provides an automatic drive-type detect feature. To use this feature for Primary Drive 0, highlight the Primary Drive 0 option and type a (for *automatic*); to use it for Primary Drive 1, highlight the Primary Drive 1 option and type a. In each case, the option setting changes to Auto. After the system reboots, the System Setup program automatically sets the correct drive-type number and options for each drive.

Before installing a new EIDE hard-disk drive, also check the documentation that came with the drive to verify that all jumper settings on the drive are appropriate for your configuration.

If You Have a Problem

If the system generates a drive error message the first time you boot your system after installing an EIDE drive, it may mean that your particular drive does not work with the automatic drive-type detect feature. If you think that your problem is related to drive type, try entering your drive-type information as described in the following subsections.

If You Know the Drive-Type Number

Use the drive-type number you found in the documentation that came with the drive, or if the drive was installed by Dell when you purchased your system, access the Manufacturing Test Report from the Dell Accessories folder.

To set the drive-type number in the System Setup program, highlight the appropriate drive option (Primary Drive 0 or Primary Drive 1) and type the correct drive-type number. If you prefer, you can press the right- or left-arrow key to increase or decrease, respectively, the drive-type number until the correct one is displayed.

If You Do Not Know the Drive-Type Number

The Primary or Secondary Drive 0 and Drive 1 options display the following five parameters for each drive:

- Drive Type is the drive-type number for the selected hard-disk drive.
- Capacity (automatically calculated by the system) indicates the number of millions of bytes of storage provided by the drive.
- Cylinders is the number of logical cylinders.
- Heads indicates the number of logical heads in the drive.
- Sectors is the number of logical sectors per track.

If none of the supported drive types match the parameters of your new drive, you can enter your own parameters. To do so, highlight the Primary or Secondary Drive 0 option and type u to display User 1. You can then use the right- or left-arrow key to switch between the User 1 and User 2 settings (only two user-defined drive types are allowed). Then press <Tab> to highlight each of the parameter fields in succession, and enter the appropriate number for each field.

NOTE: The User 1 and *User 2 drive types can be used for both the Primary and Secondary Drive 0 and Drive 1 options. However, if you select the User 1 or User 2 drive type, you may not obtain optimum hard-disk drive performance. Also, the User 1 and User 2 drive types cannot be used for hard-disk drives greater than 528 megabytes (MB) in capacity.*

Hard-Disk Drive Sequence

Hard-Disk Drive Sequence lists installed adapter cards and devices in the order they will be initialized. The first hard-disk drive in the list becomes the bootable drive C.

Boot Sequence

Boot Sequence enables you to set the order of the devices from which the system attempts to boot.

The term *boot* refers to the system's start-up procedure. When turned on, the system "bootstraps" itself into an operational state by loading into memory a small program, which in turn loads the necessary operating system. Boot Sequence tells the system where to look for the files that it needs to load.

To set the boot device order, press <Enter> to access the field's pop-up options menu. Use the up- and down-arrow keys to move through the list of devices. Press the spacebar to enable or disable a device (enabled devices appear with a check mark). Press <+> or <-> to move a selected device up and down the list. The following subsections detail typical choices.

Diskette Drive A:

Selecting Diskette Drive A: as the first device causes the system to boot from drive A first. If the system finds a diskette that is not bootable in the drive or finds a problem with the drive itself, it displays an error message. If it does not find a diskette in the drive, the system tries to boot from the next device in the boot sequence list.

Hard-Disk Drive C:

Selecting Hard Disk Drive C: causes the system to boot first from the hard-disk drive and then from the next device in the boot sequence list.

IDE CD-ROM Reader

Selecting IDE CD-ROM Reader causes the system to boot from the CD-ROM drive first. If the system finds a CD that is not bootable in the drive or finds a problem with the drive itself, it displays an error message. If it does not find a CD in the drive, the system tries to boot from next device in the boot sequence list.

PXE

Selecting PXE (Preboot eXecution Environment) causes the system to boot from the integrated network interface controller (NIC) first. If a boot routine is not available from the network server, the system tries to boot from the next device in the boot sequence list.

System Memory

System Memory indicates the entire amount of installed memory detected in your system, except for memory on Expanded Memory Specification (EMS) expansion cards. After adding memory, check this option to confirm that the new memory is installed correctly and is recognized by the system.

Reserved Memory

Reserved Memory allows you to designate a region of system board memory that can be supplied by an expansion card. You should not enable the reserved memory feature unless you are using an expansion card that requires special addressing.

For example, you may have a memory expansion card that needs to be addressed starting at 15 MB. Selecting the 15MB-16MB setting in the Reserved Memory option specifies that the base memory from 15 MB to 16 MB comes from the memory expansion card (the base memory below the 15-MB address comes from the dual in-line memory modules [DIMMs] on the system board).

The Reserved Memory option has the following settings:

- None Reserved (the default)
- 512KB-640KB
- 15MB-16MB

CPU Speed

CPU Speed indicates the processor speed at which your system boots.

Press the left- or right-arrow key to toggle the CPU Speed option between the resident processor's rated speed (the default setting) and a lower compatibility speed, which lets you accommodate speed-sensitive applications. A change to this option takes effect immediately (rebooting the system is not required).

To toggle between the rated processor speed and the compatibility speed while the system is running in real mode, press <Ctrl><Alt><\>. (For keyboards that do not use American English, press <Ctrl><Alt><#>.)

CPU ID(s)

CPU ID(s) provides the manufacturer's identification code for the installed processor(s).

Integrated Devices

Integrated Devices configures the devices integrated into the system board. Press <Enter> to configure these options.

Sound

Sound determines whether the integrated audio controller is On (the default) or Off. When Sound is set to Off, no sounds are emitted from any attached external speakers or from the on-board speaker, except for beep codes. Set Sound to Off if you want to use a sound expansion card instead of the integrated audio controller or if you need the resources used by the controller.

Network Interface Controller

Network Interface Controller determines whether the integrated NIC is set to On, Off, or On with PXE. The default is On, which means that the NIC is enabled but not set to boot the system remotely from a network server.

Mouse Port

Mouse Port enables or disables the system's built-in Personal System/2 (PS/2)-compatible mouse port. Disabling the mouse allows an expansion card to use interrupt request (IRQ) 12.

For more information about built-in ports, port designations, IRQs, and the remapping of ports, see Appendix B, "Hardware Configuration Features."

Serial Port 1 and Serial Port 2

Serial Port 1 and Serial Port 2 configure the system's built-in serial ports. These options can be set to Auto (the default) to automatically configure a port, to a particular designation (COM1 or COM3 for Serial Port 1; COM2 or COM4 for Serial Port 2), or to Off to disable the port.

If you set a serial port to Auto and add an expansion card containing a port configured to the same designation, the system automatically remaps the built-in port to the next available port designation that shares the same IRQ setting as follows:

- COM1 (input/output [I/O] address 3F8h), which shares IRQ4 with COM3, is remapped to COM3 (I/O address 3E8h).
- COM2 (I/O address 2F8h), which shares IRQ3 with COM4, is remapped to COM4 (I/O address 2E8h).

NOTE: When two COM ports share an IRQ setting, you can use either port as necessary, but ***you may not be able to use them both at the same time****. If the second port (COM3 or COM4) is also in use, the built-in port is turned off.*

For more information about built-in ports, port designations, IRQs, and the remapping of ports, see Appendix B, "Hardware Configuration Features."

Parallel Port

Parallel Port configures the system's built-in parallel port. This option can be set to 378h (the default), to alternate addresses 278h or 3BCh, or to Off to disable the port.

NOTE: Do not set Parallel Port to 278h if you have an Extended Capabilities Port (ECP) device connected to the port.

Parallel Port Mode

Parallel Port Mode controls whether the system's built-in parallel port acts as an AT-compatible (unidirectional) or PS/2-compatible (bidirectional) port.

Set this option according to the type of peripheral device connected to the parallel port. To determine the correct mode to use, see the documentation that came with the device.

IDE Drive Interface

IDE Drive Interface enables or disables the system's built-in EIDE hard-disk drive interface.

With Auto (the default) selected, the system turns off the built-in EIDE interface when necessary to accommodate a controller card installed in an expansion slot.

As part of the boot routine, the system first checks for a primary hard-disk drive controller card installed in an expansion slot. If no card is found, the system enables the built-in EIDE interface to use IRQ14 and IRQ15.

If the system detects a primary controller on the expansion bus, it disables the built-in EIDE interface.

Selecting Off disables the built-in EIDE interface.

Diskette Interface

Diskette Interface controls the operation of the system's built-in diskette drive controller.

With Auto (the default) selected, the system turns off the built-in diskette drive controller when necessary to accommodate a controller card installed in an expansion slot.

With Write Protect selected, nothing can be written to diskette drives and tape drives using the system's built-in diskette drive controller. (The system can still read from the drives.) The Auto option (whereby the system turns off the built-in diskette drive controller as necessary) is also in effect.

Selecting Off turns off the built-in diskette/tape drive controller; this option is used primarily for troubleshooting purposes.

PC Speaker

PC Speaker determines whether system sounds (other than beep codes) are emitted by the on-board speaker. A change takes effect immediately (rebooting the system is not required).

However, even with PC Speaker set to Off, sounds from the integrated audio controller will be emitted by the on-board speaker. To disable the on-board speaker completely, follow these steps:

1. **Start the Windows NT operating system.**
2. **Double-click the speaker icon in the right corner of the task bar.**
3. **From the Master Out panel, select Advanced Controls from the Options menu.**
4. **Click Advanced under the Master Out column.**
5. **Click the PC Speaker Mute check box.**

Video DAC Snoop

Video DAC Snoop lets you correct video problems that may occur when certain video expansion cards are used. The default is Off. If you are using a video card and problems such as incorrect colors or blank windows occur, set Video DAC Snoop to On.

Primary SCSI and Secondary SCSI

SCSI controls the system's on-board primary and secondary small computer system interface (SCSI) controllers. The settings for Primary SCSI and Secondary SCSI are:

- Off (the default)
- On

Refer to Chapter 7, "Using the Integrated SCSI Controllers," and Chapter 10, "Installing Drives," for information about configuring and installing SCSI devices.

System Security

System Security configures the password and chassis intrusion settings. Press <Enter> to configure these settings.

System Password

System Password displays the current status of your system's password security feature and allows you to assign and verify a new password. A new system password can be assigned only when the current status is either Not Enabled or Enabled, which is displayed in bright characters.

The System Password option has the following settings:

- Not Enabled (the default)
- Enabled
- Disabled by Jumper

NOTE: Read "Using the System Password Feature" found later in this chapter for instructions on assigning a system password and using or changing an existing system password. See "Disabling a Forgotten Password" found later in this chapter for instructions on disabling a forgotten system password.

Password Status

When Setup Password is set to Enabled, Password Status prevents the system password from being changed or disabled at system start-up.

To lock the system password, you must first assign a setup password in the Setup Password option and then change the Password Status setting to Locked. When the Setup Password feature has a password assigned and Password Status is set to Locked, the system password cannot be changed through the System Password option and cannot be disabled at system start-up by pressing <Ctrl><Enter>.

To unlock the system password, you must enter the setup password in the Setup Password option and then change the Password Status setting to Unlocked. In this state, the system password can be disabled at system start-up by pressing <Ctrl><Enter> and then changed through the System Password option.

Setup Password

Setup Password lets you restrict access to your computer's System Setup program in the same way that you restrict access to your system with the system password feature. The options are:

- Not Enabled (the default)
- Enabled
- Disabled by Jumper

NOTE: Read "Using the Setup Password Feature" found later in this chapter for instructions on assigning a setup password and using or changing an existing setup

password. See "Disabling a Forgotten Password" found later in this chapter for instructions on disabling a forgotten setup password.

Chassis Intrusion

Chassis Intrusion displays the status of the system chassis intrusion monitor.

If the computer cover is removed, the setting changes from Not Detected to Detected and the following message is displayed during the boot sequence at system start-up:

```
Alert! Cover was previously removed.
```

To clear this field and allow future intrusions to be detected, enter the System Setup program, as described in "Entering the System Setup Program" found earlier this chapter. At the Chassis Intrusion option, use the left- or right-arrow key to choose Reset. Then press <Esc> to save the changes and reboot the system.

NOTE: When enabled, the setup password is required in order to reset the Chassis Intrusion option from Detected to Not Detected. You cannot reset the Chassis Intrusion option without a password.

Keyboard NumLock

Keyboard NumLock determines whether your system boots with the Num Lock mode activated on 101- or 102-key keyboards (it does not apply to 84-key keyboards).

When Num Lock mode is activated, the rightmost bank of keys on your keyboard provides the mathematical and numeric functions shown at the tops of the keys. When Num Lock mode is turned off, these keys provide cursor-control functions according to the label on the bottom of each key.

Report Keyboard Errors

Report Keyboard Errors enables or disables reporting of keyboard errors during power-on self-test (POST), which is a series of tests that the system performs on the hardware each time you turn on the system or press the reset button.

This option is useful when applied to self-starting servers or host systems that have no permanently attached keyboard. In these situations, selecting Do Not Report suppresses all error messages relating to the keyboard or to the keyboard controller during POST. This option does not affect the operation of the keyboard itself if a keyboard is attached to the computer.

Auto Power On

Auto Power On allows you to set the time and days of the week to turn on the computer system automatically. You can set Auto Power On to turn on the system either every day or every Monday through Friday.

NOTE: This feature does not work if you turn off your system using a power strip or surge protector.

Time is kept in a 24-hour format (*hours*:*minutes*). To change the time, press the left- or right-arrow keys to select a field, and then press <+> or <-> to increase or decrease the number. If you prefer, you can type numbers in each of the fields.

The default for Auto Power On is Disabled.

Wakeup On LAN

Wakeup On LAN determines whether the Wakeup On LAN feature is set. The settings for Wakeup On LAN are:

- Off
- On (Add-in NIC)
- On (Integrated NIC)

If On (Add-in NIC) or On (Integrated NIC) is selected, a special local area network (LAN) signal from a server management console starts the system. Wakeup On LAN capability also allows remote computer setup, BIOS upgrades, software downloading and installation, file updates, and asset tracking after hours and on weekends when LAN traffic is typically at a minimum. You must reboot your system for a change to take effect.

NOTE: The Wakeup On LAN feature functions even when the computer is turned off; however, the computer must be plugged into a working electrical outlet at all times and must be shut down in the normal method expected by the operating system. Thus, if you disconnect the system power cable from its electrical outlet, if a power failure occurs, or if you shut down the system abnormally, the Wakeup On LAN feature will not work.

Power Management

For certain types of monitors and most EIDE hard-disk drives, you can reduce system power consumption by enabling the power management feature. With power management enabled, these monitors and drives automatically switch into low-power mode during periods of system inactivity.

Power Management can be implemented at three levels—Maximum, Regular, and Minimum. (The different levels apply to the monitor only; hard-disk drive operation is the same for all three.) The default for this option is Disabled.

Saving Monitor Power

If you have a Video Electronics Standards Association (VESA®) Display Power Management Signaling (DPMS)-compliant monitor, enabling the power management option reduces monitor power consumption during periods of keyboard and mouse inactivity.

CAUTION: Check your monitor documentation to make sure you have a DPMS-compliant monitor before you enable this feature. Otherwise, you risk damaging the monitor.

NOTES: The power management feature monitors activity of a mouse connected to the PS/2-compatible mouse port.

Some 3D graphics cards do not support DPMS. Refer to the 3D graphics card documentation for DPMS compliance information.

By setting Power Management to Maximum, Regular, or Minimum, you can set predefined time-out periods (see Table 3-2) for the two successive monitor shutdown stages, *standby* and *off*.

NOTE: Each monitor manufacturer defines the details of the shutdown stages for its own monitors. However, in all cases power consumption decreases with each stage from "on" (full power) to "standby" (reduced power; the display image usually disappears) to "off" (where power consumption is minimal). To define these stages for your monitor, see the documentation that came with the monitor.

For most DPMS-compliant monitors, any subsequent activity—including moving the mouse—should return full power to the monitor.

Check your monitor documentation for information on how your monitor is designed to operate.

Saving EIDE Hard-Disk Drive Power

For most systems, enabling Power Management at any level causes EIDE hard-disk drives to switch to low-power mode after about 20 minutes of system inactivity (see Table 3-2).

NOTES: All EIDE drives shipped by Dell with your system support this feature.

However, not all EIDE hard-disk drives support this feature. Enabling this feature for drives that do not support it may cause the EIDE drive to become inoperable until the computer is restarted and the Power Management option is disabled.

In low-power mode, the disks inside the drive stop spinning. They remain idle until the next drive access, which causes them to start spinning again. (Because the disks take a few seconds to regain full speed, you may notice a slight delay the next time you access the hard-disk drive.)

When Power Management is set to Disabled (the default), the disks spin constantly as long as the system is turned on.

Table 3-2. Power Time-Out Periods

Power Management Setting	EIDE Drive Spindown Time-Outs	Monitor Standby Time-Outs	Monitor Off Time-Outs
Disabled	Never	Never	Never
Maximum	20 minutes	10 minutes	1 hour
Regular	20 minutes	20 minutes	1 hour
Minimum	20 minutes	1 hour	Never

ACPI

ACPI controls the Advanced Configuration and Power Interface. If the operating system supports ACPI and ACPI is toggled On, pressing the power button momentarily places the system in a power-saving mode. You can turn the system completely off by pressing and holding the power button for more than 4 seconds. When ACPI is activated (On), IRQ 9 is not available for use by expansion cards.

When ACPI is toggled Off, pressing the power button turns the system completely off. When ACPI is not activated (Off), IRQ 9 is available for use by expansion cards.

NOTE: If your operating system does not support ACPI, the computer will not go into power-saving mode when you press the power button, even if ACPI is toggled to On in the System Setup program.

Thermal Power-Off

Thermal Power-off, when enabled, sets a timer to shut down the system approximately 3 minutes after the system BIOS detects a temperature that exceeds preset levels for a processor or hard-disk drive. This feature provides a safeguard in the event that another shutdown utility, such as the Dell AutoShutdown service, is not installed or fails to shut down the system after a preset temperature level is exceeded.

Asset Tag

Asset Tag displays the customer-programmable asset tag number for the system if an asset tag number has been assigned. You can use the Asset Tag utility, which is included with your software support utilities, to enter an asset tag number up to ten characters long into NVRAM. For information on using the utility, see Chapter 2, "Using the Software Support Utilities."

System Data Options

The following options, which are not selectable, display information about the system:

- The processor type and BIOS level are listed in the system data boxes.
- Level 2 Cache displays the size of the integrated cache.
- Service Tag displays the system's five-character service tag number, which was programmed into NVRAM by Dell during the manufacturing process. Refer to this number during technical assistance or service calls. The service tag number is also accessed by certain Dell support software, including the diagnostics software.

Using the System Password Feature

CAUTION: The password features provide a basic level of security for the data on your system. However, they are not foolproof. If your data requires more security, it is your responsibility to obtain and use additional forms of protection, such as data encryption programs.

Your Dell system is shipped to you without the system password feature enabled. If system security is a concern, you should operate your system only with system password protection.

You can assign a system password, as described in the next subsection, "Assigning a System Password," whenever you use the System Setup program. After a system password is assigned, only those who know the password have full use of the system.

When the System Password option is set to Enabled, the computer system prompts you for the system password just after the system boots.

To change an existing system password, you must know the password (see "Deleting or Changing an Existing System Password" found later in this section). If you assign and later *forget* a system password, you must remove the computer cover to change a jumper setting that disables the system password feature (see "Disabling a Forgotten Password" found later in this chapter). Note that you erase the *setup password* at the same time.

CAUTION: If you leave your system running and unattended without having a system password assigned, or if you leave your computer unlocked so that someone can disable the password by changing a jumper setting, anyone can access the data stored on your hard-disk drive.

Assigning a System Password

Before you can assign a system password, you must enter the System Setup program and check the System Password setting in the System Security option.

When a system password is assigned, the System Password setting shown is Enabled. When the system password feature is disabled by a jumper setting on the system board, the option shown is Disabled by Jumper. *You cannot change or enter*

a new system password if the Disabled by Jumper option is displayed. When a system password is not assigned, the System Password setting shown is Not Enabled.

To assign a system password, follow these steps:

1. **Verify that the Password Status setting is set to Unlocked.**

   For instructions on changing this setting, see "Password Status" found earlier in this chapter.

2. **Highlight the System Security setting and press <Enter>.**

3. **Highlight the System Password setting and press <Enter>.**

4. **Type the desired system password in the Enter Password field and press <Enter>.**

   You can use up to seven characters in your password.

   As you press each character key (or <Spacebar> for a blank space), a placeholder appears in the field.

   The password assignment operation recognizes keys by their location on the keyboard, without distinguishing between lowercase and uppercase characters. For example, if you have an *M* in your password, the system recognizes either *M* or *m* as correct.

   Certain key combinations are not valid. If you enter one of these combinations, the speaker emits a beep.

   To erase a character when entering your password, press <Backspace> or the left-arrow key.

NOTE: To escape from the field without assigning a system password, press <Esc>.

5. **Type the desired system password in the Confirm Password field and press <Enter>.**

   The system password is now assigned and is Enabled. You can exit the System Setup program and begin using your system. Password protection takes effect after the system reboots.

Using Your System Password to Secure Your System

Whenever you turn on your system, press the reset button, or reboot the system by pressing the <Ctrl><Alt><Del> key combination, the following prompt appears on the screen when the Password Status setting is set to Unlocked:

```
Type in the password and...
– press <ENTER> to leave password security enabled.
– press <CTRL><ENTER> to disable password security.
Enter password:
```

If the Password Status setting is set to Locked, the following prompt appears:

```
Type the password and press <Enter>.
```

After you type the correct system password and press <Enter>, your system boots and you can use the keyboard and/or mouse to operate your system as usual.

NOTE: If you have assigned a setup password (see "Using the Setup Password Feature" found later in this chapter), the system accepts your setup password as an alternate system password.

If a wrong or incomplete system password is entered, the following message appears on the screen:

```
** Incorrect password. **
Enter password:
```

If an incorrect or incomplete system password is entered again, the same message appears on the screen.

The third and subsequent times an incorrect or incomplete system password is entered, the system displays the following message:

```
** Incorrect password. **
Number of unsuccessful password attempts: 3
System halted! Must power down.
```

The number of unsuccessful attempts made to enter the correct system password can alert you to an unauthorized person attempting to use your system.

Even after your system is turned off and on, the previous message is displayed each time an incorrect or incomplete system password is entered.

NOTE: You can use the Password Status setting in conjunction with System Password and Setup Password to further protect your system from unauthorized changes. For more information, see "Password Status" found earlier in this chapter.

Deleting or Changing an Existing System Password

To delete or change an existing system password, follow these steps:

1. **Enter the System Setup program and verify that the Password Status setting is set to Unlocked.**

   Enter the System Setup program by pressing <F2>. For instructions on changing the setting for Password Status, see "Password Status" found earlier in this chapter.

2. **Highlight the System Security setting and press <Enter>.**

3. **Highlight the System Password setting and press <Enter>.**

4. **To delete an existing system password, press <Enter> in the Enter Password field and in the Confirm Password field. To change an existing system password, type the new password in the Enter Password field and press <Enter>, and then type the new system password in the Confirm Password field and press <Enter>.**

   If a character is illegal for password use, the system emits a beep. If the system password is deleted, the System Password setting changes to Not Enabled. If the system password is changed, the System Password option remains Enabled.

NOTE: An existing system password can also be disabled when the system is rebooted, as explained in "Using Your System Password to Secure Your System" found earlier in this section.

If you want to assign a new system password, follow the procedure in "Assigning a System Password" found earlier in this section.

Using the Setup Password Feature

Your Dell system is shipped to you without the setup password feature enabled. If system security is a concern, you should operate your system with setup password protection.

You can assign a setup password, as described in the next subsection, "Assigning a Setup Password," whenever you use the System Setup program. After a setup password is assigned, only those who know the password have full use of the System Setup program.

To change an existing setup password, you must know the setup password (see "Deleting or Changing an Existing Setup Password" found later in this section). If you assign and later *forget* a setup password, you need to remove the computer cover to change a jumper setting that disables the setup password feature (see "Disabling a Forgotten Password" found later in this chapter). Note that you erase the *system password* at the same time.

Assigning a Setup Password

To assign a setup password, follow these steps:

1. **Enter the System Setup program.**
2. **Highlight the System Security option and press <Enter>.**
3. **Highlight the Setup Password option and press <Enter>.**
4. **Type the desired setup password in the Enter Password field and press <Enter>.**

   If a character is illegal for password use, the system emits a beep.

5. **Type the desired setup password in the Confirm Password field and press <Enter>.**

   The setup password is now assigned and is Enabled.

NOTES: The setup password can be the same as the system password.

If the two passwords are different, the setup password can be used as an alternate system password. However, the system password cannot be used in place of the setup password.

After you verify the password, the Setup Password setting changes to Enabled. The next time you enter the System Setup program, the system prompts you for the setup password.

A change to the Setup Password setting becomes effective immediately (rebooting the system is not required).

Operating With a Setup Password Enabled

If Setup Password is set to Enabled, you must enter the correct setup password before you can modify the majority of the System Setup options.

When you start the System Setup program, the System Setup screen appears with the Setup Password setting highlighted, prompting you to type the password.

If you do not enter the correct password, the system lets you view, but not modify, the System Setup screen—with the following exceptions:

- You can still modify the System Date, System Time, CPU Speed, Keyboard Num Lock, and PC Speaker options.
- If System Password is not enabled and is not locked via the Password Status option, you can assign a system password (however, you cannot disable or change an existing system password).

NOTE: You can use the Password Status setting in conjunction with the Setup Password feature to protect the system password from unauthorized changes. For more information, see "Password Status" found earlier in this chapter.

Deleting or Changing an Existing Setup Password

To delete or change an existing setup password, follow these steps:

1. **Enter the System Setup program.**
2. **Highlight the System Security setting and press <Enter>.**
3. **Highlight the Setup Password setting and press <Enter>.**
4. **To delete an existing setup password, press <Enter> in the Enter Password field and in the Confirm Password field. To change an existing setup password, type the new password in the Enter Password field and press <Enter>, and then type the new setup password in the Confirm Password field and press <Enter>.**

   If a character is illegal for password use, the system emits a beep. If the setup password is deleted, the Setup Password setting changes to Not Enabled. If the setup password is changed, the Setup Password option remains Enabled.

If you want to assign a new setup password, follow the procedure in "Assigning a Setup Password" found earlier in this section.

Disabling a Forgotten Password

If you forget your system or setup password, you cannot operate your system or change settings in the System Setup program until you remove the computer cover, change the password jumper setting to disable the passwords, and erase the existing passwords.

To disable a forgotten password, follow these steps:

1. **Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 8.**

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.
2. **Remove the jumper plug from the PSWD jumper to disable the password feature.**

   Refer to Table B-1 for jumper information and to Figure B-1 for the location of the password jumper (labeled "PSWD") on the system board.
3. **Replace the computer cover.**
4. **Reconnect your computer and peripherals to their power sources, and then turn them on.**

   Booting your system with the PSWD jumper plug removed erases the existing password(s).

NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

5. **To reset the chassis intrusion detector, enter the System Setup program and reset Chassis Intrusion to Not Detected.**

   See "Chassis Intrusion" earlier in the chapter for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

6. **In the System Setup program, verify that the password is disabled. Proceed to step 7 if you want to assign a new password.**

NOTE: Before you assign a new system and/or setup password, you must replace the PSWD jumper plug.

7. **Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 8.**

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

8. **Replace the PSWD jumper plug.**

9. **Replace the computer cover, and then reconnect the computer and peripherals to their power sources and turn them on.**

   Booting with the PSWD jumper installed reenables the password feature. When you enter the System Setup program, both password options appear as Not Enabled, meaning that the password feature is enabled but that no password has been assigned.

NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

10. **To reset the chassis intrusion detector, enter the System Setup program and reset Chassis Intrusion to Not Detected.**

    See "Chassis Intrusion" earlier in the chapter for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

11. **Assign a new system and/or setup password.**

    To assign a new system password, see "Assigning a System Password" found earlier in this chapter. To assign a new setup password, see "Assigning a Setup Password" found earlier in this chapter.

Responding to Error Messages

If an error message appears on your monitor screen while the system is booting, make note of the message. Then, before entering the System Setup program, refer to your *Diagnostics and Troubleshooting Guide* for an explanation of the message and suggestions for correcting any errors. However, it is normal to receive an error message the first time you boot the system after a memory upgrade. In that case, you do not need to refer to the *Diagnostics and Troubleshooting Guide*; instead, refer to the instructions in "Adding Memory" in Chapter 9 of this guide.

If you are given an option of pressing either <F1> to continue or <F2> to run the System Setup program, press the <F2> key.

CHAPTER 4
Using the ISA Configuration Utility

The ISA Configuration Utility (ICU) is used by the system to track what expansion cards are installed and what resources are used. With this information, the system automatically configures Plug and Play expansion cards and Peripheral Component Interconnect (PCI) expansion cards and can tell you how to configure non-Plug and Play Industry-Standard Architecture (ISA) expansion cards manually by setting jumpers or switches. Plug and Play and PCI expansion cards do not contain jumpers and switches; they are configured only through software in the basic input/output system (BIOS).

CAUTION: The ICU is intended only for configuring non-Plug and Play ISA expansion cards. It should not be used for assigning resources to Plug and Play expansion cards and PCI expansion cards. These cards should be configured automatically by the BIOS.

NOTE: The Windows NT operating system does not provide full Plug and Play support. Therefore, some Plug and Play cards (such as modem, sound, and network cards) may not work with Windows NT. If your system is running a Dell-installed Windows NT operating system and you want to use Plug and Play cards, Dell recommends that you use the card manufacturer's configuration utility to set the card to legacy mode, enter the card's resources through the manufacturer's utility, and then use the ICU to add the Plug and Play card to your system configuration. On systems with a Dell-installed Windows NT operating system, the ICU is installed on the hard-disk drive as a diskette image. Use the Program Diskette Maker (located in the Dell Accessories program folder) to make an ICU diskette from this diskette image.

The remainder of this chapter describes the various features of, and the various ways to use, the ICU.

Quick Start

To quickly get started using this utility, follow these steps:

1. **Determine whether you need to run the ICU.**

   See "When to Run the ICU" found later in this chapter for detailed instructions.

2. **Perform any required preparatory steps before starting the utility.**

   Preparatory steps include making a program diskette, copying your mouse driver to this diskette, and making a backup copy of this diskette. See "Preparing to Use the ICU" found later in this chapter for detailed instructions.

3. **Start the system using your ICU diskette.**

   Verify that Boot Sequence in the System Setup program is set to Diskette First. Then insert the backup copy of the ICU diskette into drive A, and turn on your computer or press the reset button.

   NOTE: The ICU takes a few minutes to load. During this time, the cursor may appear as a pointer rather than as an hourglass.

   When the utility has finished loading, the ICU window (see Figure 4-1) is displayed.

4. **Add, modify, or remove a card, or view resources for a card or other device.**

   Depending on what you need to accomplish with the ICU, you may need to perform one or more of these tasks:

   - If you are adding a non-Plug and Play ISA expansion card, see "Adding a Listed Card" found later in this chapter for detailed instructions. If the card you are adding does not have a configuration file, see "Adding an Unlisted Card" found later in this chapter for detailed instructions.
   - If you are modifying a card that is already installed, see "Modifying a Card" found later in this chapter for detailed instructions.
   - If you are removing a card, see "Removing a Card" found later in this chapter for detailed instructions.
   - If you want to examine the resources already assigned in the system, see "Viewing Resources" found later in this chapter for detailed instructions.

5. **Save your configuration, and exit the utility.**

   See "Saving the System Configuration" and "Exiting the ICU" found later in this chapter for detailed instructions.

About the ICU

Before your system was shipped from Dell, a technician used the ICU to enter the correct information for the expansion cards initially installed in your computer.

If your system was shipped with Dell-installed software, the ICU diskette image (from which you can make an ICU diskette) is installed on your hard-disk drive. (Your system may also be accompanied by an *ISA Configuration Utility Diskette*.)

The ICU is also available through online services such as Dell's TechConnect bulletin board service (BBS). See the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide* for information on accessing the BBS.

Whenever you add or remove a non-Plug and Play ISA expansion card, use the ICU to reconfigure your system. The utility reads the card's corresponding configuration file (**.cfg** file), which describes the card's characteristics and required system resources. After the resources identified in these configuration files are assigned to all non-Plug and Play ISA expansion cards, the system assigns resources to all Plug and Play expansion cards, as well as PCI expansion cards, thereby creating a conflict-free configuration.

ICU Database

The ICU provides a database of configuration files for a large variety of non-Plug and Play ISA expansion cards. The database is located in the **\db** subdirectory. *Listed cards* are non-Plug and Play ISA expansion cards that have configuration files stored in this database.

Unlisted cards are non-Plug and Play ISA expansion cards that do not have configuration files stored in the ICU database. Unlisted cards are not displayed in the list of cards provided for the various card categories. The unlisted cards may be cards for which no configuration file exists or new cards that include a manufacturer-supplied configuration file on diskette.

When you supply a configuration file and the ICU is running from the hard-disk drive, the configuration file is copied to the directory that contains the rest of the ICU database.

When to Run the ICU

Whenever you add or remove non-Plug and Play ISA expansion cards, you must run the ICU to ensure that no two cards attempt to use the same resources (such as interrupt request [IRQ] lines).

Run the program *before* adding or removing any non-Plug and Play ISA expansion cards. The ICU can identify and resolve any resource conflicts and indicate the proper jumper and switch settings for each expansion card to avoid such conflicts. Running the program first helps you determine how to configure a non-Plug and Play ISA expansion card before you install it in your computer.

After you have run the ICU for your non-Plug and Play ISA expansion cards and it has configured all your Plug and Play and PCI expansion cards, you can use the utility to *lock* the configuration of your Plug and Play and PCI expansion cards so that they are always assigned the same resources. See "Locking and Unlocking Cards" found later in this chapter for details.

Preparing to Use the ICU

Before using the ICU for the first time, you must complete the following steps:

1. **If your system includes Dell-installed software, make a program diskette of the ICU from the diskette image on your hard-disk drive.**

   For instructions on how to create a program diskette from the diskette image, see the online help provided in the Program Diskette Maker, which is available in the Dell Accessories program folder.

NOTE: If you received an ISA Configuration Utility Diskette *with your system, skip to step 2.*

2. **If you want to use your mouse with the ICU, copy your mouse driver file (**mouse.exe**) to your ICU diskette.**

3. **Make a backup copy of your ICU diskette, as described in the next subsection, "Backing Up the ICU Diskette."**

   Use the backup copy whenever you run the utility; store the original diskette in a safe place.

Backing Up the ICU Diskette

Before using the ICU, make a backup copy of the ICU diskette by performing the following steps.

NOTE: If you received an ISA Configuration Utility Diskette *with your system, you should use this procedure to create a backup of that diskette.*

1. **Make sure you have a blank, high-density, 3.5-inch diskette.**

2. **Turn on your computer system if it is not already on.**

3. **Make a copy of the ICU program diskette.**

   See your operating system documentation for instructions on making a copy of a diskette.

4. **Store your original ICU diskette in a safe place.**

   Use only the backup diskette when running the ICU.

Starting the ICU

After you have completed the procedure in "Preparing to Use the ICU" found earlier in this chapter, insert the backup copy of the ICU diskette into drive A. Then either turn on your computer or reboot it by pressing the reset button.

Accessing Help

You can access online help in the ICU in four ways:

- Select Contents from the Help menu to display a list of topics. Select a topic and click Help. Help text on that topic appears in a dialog box.
- For most dialog boxes, you can click Help to display information on the action you are performing.
- From the ICU window, press the <F1> key to display a list of available help topics.
- To redisplay the last message you received from the ICU, select Previous Message from the Help menu.

Making Selections in the ICU

The ICU window is the main window of the utility and the starting point for making expansion-card changes. This window lists all non-Plug and Play ISA, Plug and Play, and PCI expansion cards currently installed in the computer. The ICU window contains menus and a tool bar, as shown in Figure 4-1. When you choose a course of action, the ICU displays dialog boxes to guide you through the various steps.

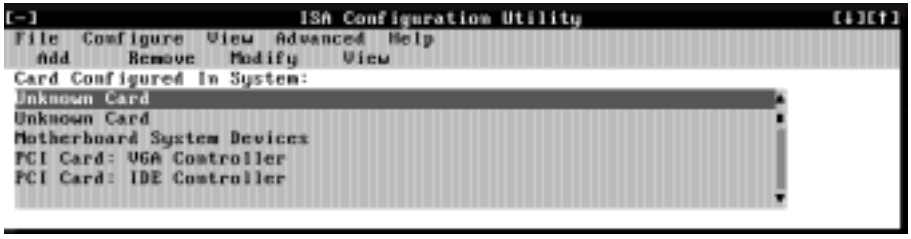


Figure 4-1. ICU Window

You can maneuver through each menu and dialog box using a mouse. If a mouse is not available, you can use the keys shown in Table 4-1.

Each menu and menu option has an underlined character in its name; when you press the <Alt> key in conjunction with the key for the underlined character, that menu or menu option is selected.

Table 4-1. ICU Keys

Keys	Action
<Alt><*x*><*y*>	Displays the menu containing the underlined letter *x* and performs the operation indicated by the menu item containing the underlined letter *y*. For example, to save a file (that is, to display the File menu and select the Save menu option), press <Alt><f> and <s>.
<Tab>	Moves from one control button or list to another.
Up- and down-arrow keys	Moves up and down through items in a list.
<Spacebar>	Highlights an item in a list.
<Enter>	Selects the highlighted button or item in a list.

Adding a Listed Card

NOTE: If you want to add a configuration file that you received on diskette with a new expansion card, you must copy the configuration file to the **\db** *subdirectory on the backup copy of the ICU diskette. You should then reboot your system and perform the following procedure to add the expansion card.*

Use the following procedure to add a listed card with the ICU:

1. **Start the ICU as described in "Starting the ICU" found earlier in this chapter.**
2. **From the ICU window, click Add or select Add Card from the Configure menu.**
3. **Click the name of the category of card that you want to add. If you clicked Add in step 2, click OK.**

   A dialog box like the one in Figure 4-2 appears, listing the names of all available cards of that type.

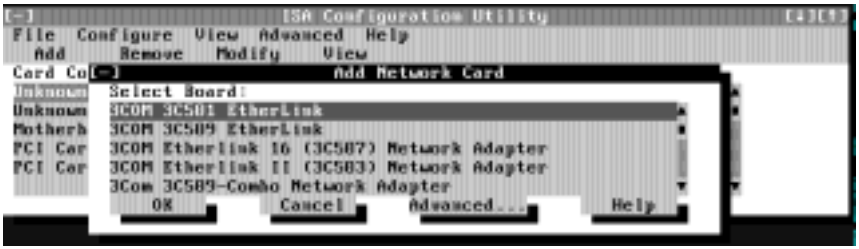


Figure 4-2. Add Network Card Dialog Box

4. **Select the name of the card you want to add.**

   If the card is not listed, see "Adding an Unlisted Card" found next in this chapter.

5. **If you want the ICU to select the resources for the card, click OK. Otherwise, skip to step 6.**

   The ICU uses the default resources set by the card manufacturer whenever possible. If the ICU cannot find a resource that is valid for the card and available in the system, the utility generates an error message. See Appendix C, "ISA Configuration Utility Messages," for an explanation of the message and a possible solution to the conflict.

   If you are satisfied with the default resources assigned to the card, you can skip the remainder of this procedure.

6. **To select the resources yourself, click Advanced.**

   The Card Configuration dialog box (see Figure 4-3) displays all resources used by the card. Some cards have multiple functions, each having one or more resources associated with it. For example, a communications card can have fax, modem, and scanner functions, each of which may have one or more associated resources.

Figure 4-3. Card Configuration Dialog Box

7. **To change any of the resource settings for the card, select the resource setting and then click Settings.**

   The Configuration Settings dialog box (see Figure 4-4) displays the name of the resource that you selected in the upper-left corner of the box. The resource values currently associated with the selected function are displayed in the Resources for Choice box. The resource values displayed are IRQ, DMA, Memory (Hex), and I/O Port (Hex).

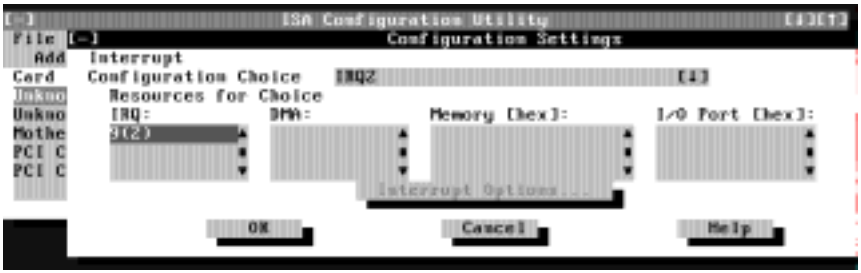


Figure 4-4. Configuration Settings Dialog Box for Assigning an IRQ Line

8. **To change the resource settings, click the down arrow next to the Configuration Choice box. Then click the new resource setting from the list of available settings (see Figure 4-5).**

   You cannot manually enter a value; you must choose a setting from the list. If there is only one setting listed, no other settings are available.

   The setting that you select may affect the resources available. For example, if you are offered the Disabled option and select it, all resource values are blank, indicating that a disabled setting uses no resources.

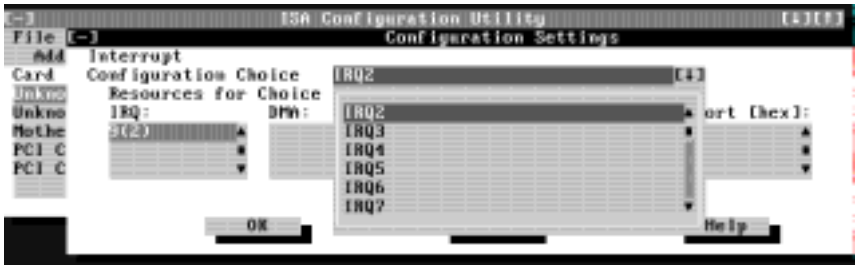


Figure 4-5. Available Settings List Box

9. **To change individual resource values for the current configuration setting, select the resource value that you want to change and click the Options button located below the resource values (see Figure 4-6).**

   For example, when you click the value under DMA, the Options button changes to the DMA Options button. When you click this button, a smaller dialog box appears. By clicking the down arrow next to the current resource value, you can display a list of the available values for the resource.

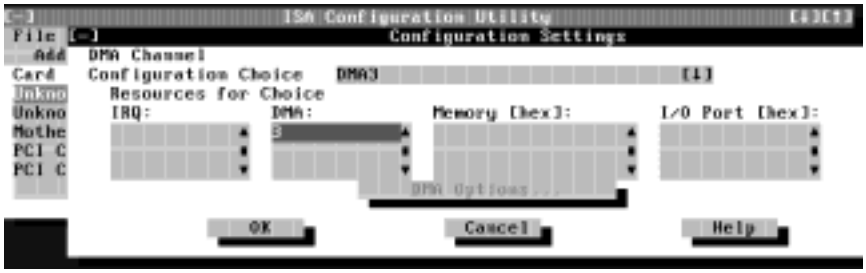


Figure 4-6. Configuration Settings Dialog Box for Assigning a DMA Channel

Choose the desired value and click OK. The value you selected is displayed under the resource heading in the Configuration Settings dialog box.

The Options button is disabled if no alternative values are available for the selected resource.

NOTE: If you change one or more resource values using the Options button and later change the setting in the Configuration Choice box, the changes that you made to the resource values are overwritten by the default values for the new configuration choice.

10. **Click OK in the Configuration Settings dialog box when you have finished selecting resources for the function.**

NOTE: After modifying the system configuration, you must turn off the system to install, remove, or change jumper settings on the non-Plug and Play ISA expansion cards to match the settings you selected in the ICU.

Adding an Unlisted Card

Unlisted cards are non-Plug and Play ISA expansion cards that do not have configuration files stored in the ICU database.

NOTE: If you want to add a configuration file that you received on diskette with a new expansion card, see "Adding a Listed Card" found earlier in this chapter.

To add an unlisted card with the ICU, perform the following steps:

1. **Start the ICU as described in "Starting the ICU" found earlier in this chapter.**
2. **From the ICU window, click Add or select Add Card from the Configure menu.**
3. **Click the name of the category of card that you want to add. If you clicked Add in step 2, click OK.**

   A dialog box appears, listing the names of all available cards of that type.

4. **Select Unlisted Card from the bottom of the list of cards displayed in the dialog box that appears. Then click OK.**

5. **Click No when the ICU asks if you have a configuration file for the card.**

   The Configure Unlisted Card dialog box appears with blank fields.

6. **Enter the name of the card that you want to add in the Card Name field.**

7. **For each resource you want to assign to the card, click the box beneath the name of the resource to be assigned and then click Add.**

   For example, if you click the box beneath IRQ, the button changes to Add Interrupt. When you click this button, a Specify dialog box (in this case, Specify Interrupt) appears. Figure 4-7 shows the Configure Unlisted Card dialog box with the Specify Interrupt dialog box opened.

Figure 4-7. Specify Interrupt Dialog Box

If you are providing a value for the IRQ or direct memory access (DMA) resource, click the down arrow beneath Available Resources. A smaller Specify list box appears (see Figure 4-8). Click the value you want to assign to the resource. Then click OK.

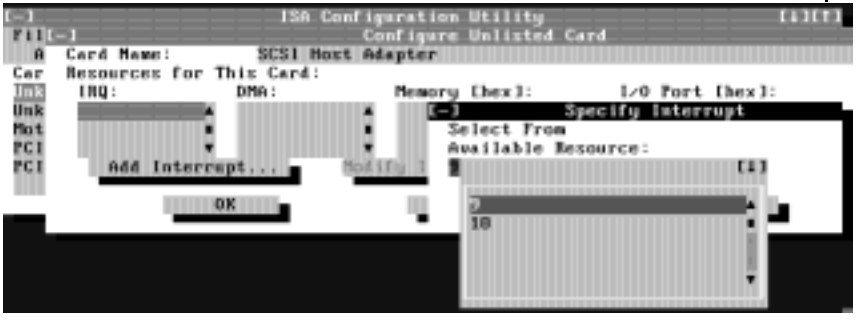


Figure 4-8. Specify Interrupt List Box

If none of the values for the DMA or IRQ resources match the allowable values for your unlisted card (as indicated in the card's documentation), select one of the available values offered by the utility and click OK.

If you are providing values for the input/output (I/O) port or memory resources, you must enter the starting and ending addresses in hexadecimal format using the two fields provided by the Specify Memory or Specify I/O Port dialog box. Click each box in succession to enter the beginning and ending addresses, and then click OK to complete the selection. Figure 4-9 shows the two fields.

Figure 4-9. Specify I/O Port Dialog Box

8. **When you have finished selecting resources for the unlisted card, click OK in the Configure Unlisted Card dialog box.**

   A message box appears, notifying you either that the card is using its default settings or that it cannot use its default settings and must be reconfigured.

9. **Click OK. If the card must be reconfigured, record the resource settings recommended by the ICU. Click Close to accept the resource settings currently displayed.**

10. **If you had to assign a disallowed resource value to the card in steps 7, 8, and 9, click each of the other cards, and then click View until you find another card using a resource value that is allowed for the unlisted card. Reassign the resource setting for this other card using the procedure in the next section, "Modifying a Card." Then modify the resource settings for the unlisted card so that it uses an allowable value.**

NOTE: After modifying the system configuration, you must turn the system off to install, remove, or change jumper settings on the non-Plug and Play ISA expansion cards to match the settings you selected in the ICU.

Modifying a Card

Modifying a card allows you to change the system resources used by a card. This feature is helpful when you want to add a card that requires resources already in use by other cards or devices in your computer. You can allocate different resources to the cards currently in your computer to free the resources necessary for the card you want to install.

You can also use this feature to force Plug and Play or PCI expansion cards to use specific resource values. This procedure is called *locking* a card. You should lock a card

only if it uses static device drivers. See "Locking and Unlocking Cards" found later in this chapter for more information.

NOTE: You cannot modify the resources of a Plug and Play or PCI expansion card. You can only view the resources currently assigned and lock or unlock them.

To modify the resource settings for a listed or unlisted card, complete the following steps:

1. **Start the ICU as described in "Starting the ICU" found earlier in this chapter.**

2. **Select the card from the list of installed cards in the ICU window, and choose Modify Card from the Configure menu or click Modify.**

   If the Card Configuration dialog box appears, the selected card is listed (it has a configuration file in the ICU database). Continue with step 3.

   If the Configure Unlisted Card dialog box appears, the card is unlisted (it does not have a configuration file). Proceed to step 5.

NOTE: When you modify an unlisted card, the ICU cannot show you the valid resources for the card. Therefore, you must have documentation from the card manufacturer that describes the resources and resource settings that the card can use.

3. **Follow steps 7 through 9 in "Adding a Listed Card" found earlier in this chapter. Then continue with step 4 of this procedure.**

4. **Click OK to complete the card modifications and return to the ICU window.**

   You have completed this procedure; do not proceed to step 5.

5. **To add, modify, or remove a resource value, select the box beneath the resource to be assigned, and then click Add, Modify, or Remove, respectively.**

   For example, if you click the box beneath IRQ, the Add, Modify, and Remove buttons change to Add Interrupt, Modify Interrupt, and Remove Interrupt. When you click one of these buttons, a smaller Specify list box (in this case, Specify Interrupt) appears.

   If you are providing a value for the IRQ or DMA resource, click the down arrow beneath Available Resources. Click the value you want to assign to the resource. If the resource can be shared with another card or device, click Sharable. Then click OK.

   If none of the values for the DMA or IRQ resource match the allowable values for your unlisted card (as indicated in the card's documentation), select one of the available values offered by the utility and click OK.

   If you are providing values for the I/O port or memory resource, you must enter the starting and ending addresses in hexadecimal format using the two fields provided by the Specify Memory or Specify I/O Port dialog box.

6. **When you have finished selecting resources for the unlisted card, click OK in the Configure Unlisted Card dialog box.**

   A message box appears, notifying you either that the card is using its default settings or that it cannot use its default settings and must be reconfigured.

7. **Click OK. If the card must be reconfigured, record the resource settings recommended by the ICU. Click Close to accept the resource settings currently displayed.**

8. **If you had to assign a disallowed resource value to the card in steps 5, 6, and 7, click each of the other cards, and then click View until you find another card using a resource value that is allowed for the unlisted card. Reassign the resource setting for this other card. Then modify the resource settings for the unlisted card so that it uses an allowable value.**

NOTE: After modifying the system configuration, you must turn off the system to install, remove, or change jumper settings on the non-Plug and Play ISA expansion cards to match the settings you selected in the ICU.

Removing a Card

Before you remove a non-Plug and Play ISA expansion card from your computer, you must use the ICU to remove the card from the system configuration.

NOTE: When you remove a Plug and Play or PCI expansion card from your computer, you do not need to run the ICU. To remove a Plug and Play or PCI expansion card, complete steps 2 through 8 in "Removing an Expansion Card" in Chapter 9.

Use the following procedure to remove a non-Plug and Play ISA expansion card from your computer:

1. **Start the ICU as described in "Starting the ICU" found earlier in this chapter.**

2. **Select the card from the current system configuration list in the ICU window.**

3. **Select Remove Card from the Configuration menu, or click Remove.**

   The ICU requests verification that you want to remove the card.

4. **Click Yes to free the resources allocated to the card and remove the card's name from the list of active cards, or click No to cancel the operation.**

   The ICU returns to the ICU window.

CAUTION: After removing a card from the system configuration using the ICU, you must turn off the system and physically remove the card. Failure to do so can damage your system.

5. **Remove the non-Plug and Play ISA expansion card from the computer.**

   See "Removing an Expansion Card" in Chapter 9 for instructions.

Viewing Resources

The ICU displays all resources currently used by your system.

To view all system resources, select System Resources from the View menu or click View. The System Resource Usage dialog box (see Figure 4-10) displays all resources currently used by the system.

Figure 4-10. System Resource Usage Dialog Box

To determine which card uses a particular resource shown in the System Resource Usage dialog box, select the resource in question and then click Used By Card. The Card Resource Usage dialog box appears with the information.

To view the resources that a particular card is using, select the card from the list displayed in the ICU window, and then select Card Resources from the View menu or click View. The Card Resource Usage dialog box displays the resources assigned to that card. Figure 4-11 shows resources that might be assigned to a network adapter card.

Figure 4-11. Card Resource Usage Dialog Box

You can save the information displayed in the resource usage dialog box by clicking Print To File. The ICU then prompts you for a filename.

Saving the System Configuration

You can save the system configuration to nonvolatile random-access memory (NVRAM) as you configure each card's resources. To do so, select Save from the File menu and continue with your operation.

Exiting the ICU

At the ICU window, select Exit from the File menu to exit the utility. If you have made any changes to the system configuration, you are asked whether you want to save the changes.

If you click Yes, the ICU saves the updated system configuration information into NVRAM. If you click No, you exit the ICU without saving any of your configuration changes. If you click Cancel, nothing is saved and the utility continues to operate.

Locking and Unlocking Cards

The ICU includes a locking mechanism that enables you to allocate the system resources for all or for some functions of Plug and Play and PCI expansion cards. These expansion cards are *dynamic*, which means that they are allocated resources at system start-up. Device drivers that do not support this dynamic card configuration are referred to as *static device drivers*.

To determine whether your expansion card has static device drivers, check the documentation that came with the drivers. If you are using a static device driver, you need to permanently associate resources with a Plug and Play expansion card, instead of relying on the default Plug and Play behavior. Otherwise, the device driver might not be able to find the card the next time the system boots. This procedure is referred to as *locking* a card.

NOTE: The locking feature of the ICU is valid only for Plug and Play and PCI expansion cards.

Locking and Unlocking All Resources

To lock or unlock all the resources and configurations for a Plug and Play or PCI expansion card, perform the following steps:

1. **If it is not already installed, install the Plug and Play or PCI expansion card. Then turn on the system.**

   Complete steps 2 through 8 in "Installing an Expansion Card" in Chapter 9.

2. **Start the ICU.**

   See "Starting the ICU" found earlier in this chapter.

3. **Select Locking Enabled from the Advanced menu in the ICU window.**

   A check mark next to Locking Enabled signifies that the feature is active; a Lock button appears on the tool bar.

4. **Select the Plug and Play or PCI expansion card that you want to lock or unlock from the Cards Configured in System list.**

5. **Click Lock or select Lock/Unlock Card from the Advanced menu.**

   Both options toggle the lock state of the selected card.

Locking and Unlocking Configuration Resources

You can also lock and unlock individual resources for a Plug and Play or PCI expansion card. To do so, perform the following steps:

1. **If it is not already installed, install the Plug and Play or PCI expansion card. Then turn on the system.**

   Complete steps 2 through 8 in "Installing an Expansion Card" in Chapter 9.

2. **Start the ICU.**

   See "Starting the ICU" found earlier in this chapter.

3. **Select Locking Enabled from the Advanced menu in the ICU window.**

   A check mark next to Locking Enabled signifies that the feature is active; a Lock button appears on the tool bar.

4. **Select the Plug and Play or PCI expansion card that you want to lock or unlock from the Cards Configured in System list.**

5. **Click Modify or select Modify Card from the Configure menu.**

6. **From the Card Configuration dialog box, select the function you want to lock or unlock.**

7. **Click Settings.**

8. **Modify the resource setting and/or resources offered on the Configuration Settings dialog box, if necessary.**

   See "Modifying a Card" found earlier in this chapter for more information.

9. **Select Lock Resources.**

   The Lock Resources box toggles the lock state of the selected configuration setting.

10. **Repeat steps 6 through 9 for any other configuration settings that you want to lock or unlock.**

11. **Click OK in the Card Configuration dialog box when you have finished making your selections.**

CHAPTER 5
Using the Network Interface Controller

This chapter describes how to connect your computer system to an Ethernet network using the integrated 3Com Peripheral Component Interconnect (PCI) 3C905b-TX network interface controller (NIC). The NIC provides all the functions normally provided by a separate network expansion card.

The integrated NIC includes a Wakeup On LAN feature that enables the computer to be started up by a special local area network (LAN) signal from a server management console. Wakeup On LAN capability allows remote computer setup, BIOS upgrades, software downloading and installation, file updates, and asset tracking after hours and on weekends when LAN traffic is typically at a minimum. For instructions on using this feature, see "Wakeup On LAN" in Chapter 3.

NOTES: The Wakeup On LAN feature functions even when the computer is turned off; however, the computer must be plugged into a working electrical outlet at all times and must be shut down in the normal method expected by the operating system. Thus, if you disconnect the system power cable from the electrical outlet, if a power failure occurs, or if you shut down the system abnormally, the Wakeup On LAN feature will not work.

When Wakeup On LAN is enabled in the System Setup program, the green link integrity indicator on the NIC connector (see Figure 5-1) remains on when the computer is turned off.

This chapter also provides instructions for configuring the NIC under the Microsoft Windows NT 4.0 operating system.

NOTE: The NIC drivers for systems running a Dell-installed Windows NT 4.0 operating system are automatically detected and installed. Instructions for reinstalling these NIC drivers are included later in this chapter.

The NIC connector on the computer's back panel (see Figure 5-1) has the following indicators:

- A yellow *activity indicator* flashes when the system is transmitting or receiving network data. (A high volume of network traffic may make this indicator appear to be in a steady "on" state.)
- A green *link integrity indicator* lights up when there is a good connection between the network and the NIC. When the green indicator is off, the computer is not detecting a physical connection to the network or the power source to the computer has been shut off.

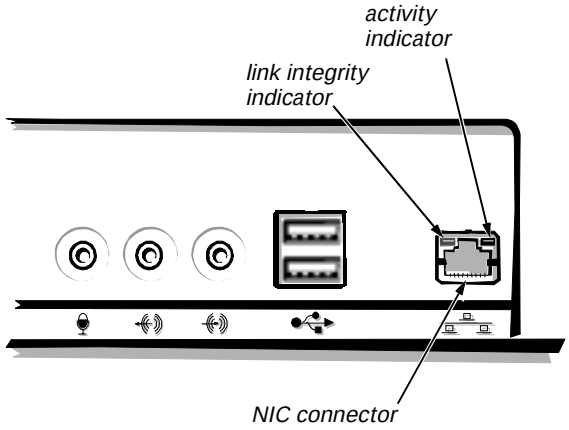


Figure 5-1. NIC Connector and Indicators

Connecting to a Network

To connect your system to and configure it for use on an Ethernet network, you must complete the following steps:

1. **Connect the network cable to the back of your computer.**

   See the following subsection, "Network Cable Requirements," for detailed instructions.

2. **Verify that the NIC is enabled in the System Setup program.**

   See "NIC" in Chapter 3 for instructions.

3. **Configure the NIC and install the network driver.**

   See "Configuring the NIC" found later in this chapter for detailed instructions.

4. **Run the Network Interface Test Group in the Dell Diagnostics to verify that the NIC is operating properly.**

   See the chapter titled "Running the Dell Diagnostics" in your *Diagnostics and Troubleshooting Guide* for detailed instructions.

Network Cable Requirements

Your computer's NIC connector (an RJ45 connector located on the back panel; see Figure 5-1) is designed for attaching an unshielded twisted pair (UTP) Ethernet cable. Press one end of the UTP cable into the NIC connector until the cable snaps securely into place.

Connect the other end of the cable to an RJ45 jack wall plate or to an RJ45 port on an Ethernet UTP concentrator or hub, depending on your network configuration. Observe the following cabling restrictions for 10BASE-T and 100BASE-TX networks:

- For 10-megabit (Mb) operation, use Category 3, 4, or 5 wiring and connectors. For 100-Mb operation, use Category 5 wiring and connectors. Voice and data lines should be in separate sheaths.
- The maximum cable run length (from a workstation to a concentrator) is 100 meters (m) (328 feet [ft]).
- The maximum number of workstations (not counting concentrators) on a network is 1024.
- The maximum number of daisy-chained concentrators on one network segment is four.

Configuring the NIC

This section provides instructions for configuring the computer's integrated, 10/100-megabits-per-second (Mbps) 3Com NIC under Microsoft Windows NT 4.0 operating systems.

NOTE: If you reinstall Windows NT 4.0, you must install Service Pack 3 and the Microsoft updated ATAPI driver before you can install the NIC drivers.

Windows NT 4.0 NIC Driver

The Windows NT 4.0 operating system automatically detects and installs the NIC driver. To reinstall the driver, complete the following steps.

1. **Use the Program Diskette Maker (located in the Dell Accessories program folder) to make a diskette copy of the NIC drivers installed on your hard-disk drive.**
2. **Connect the network cable to the back of your computer.**

   See "Network Cable Requirements" found earlier in this chapter for detailed instructions.
3. **Verify that the NIC is enabled in the System Setup program.**

   See "NIC" in Chapter 3 for more information.

4. **Start the Windows NT operating system, and log in as user Administrator or as a user with Administrator privileges.**

   For information on administrative users and privileges, see your Windows NT documentation.

5. **Double-click My Computer, double-click Control Panel, and then double-click the Network icon.**

NOTE: If you are installing networking on your system for the first time, the Windows NT operating system displays a message asking if you want to install networking. Click Yes, and refer to your Windows NT documentation for instructions.

6. **Click the Adapters tab in the Network Control Panel, and then click Add to access the Select Network Adapter window.**

7. **Click Have Disk. Insert the NIC driver diskette 2 into drive A, type** `a:\`**, and then click OK.**

   The Select OEM Option dialog box appears.

8. **Select 3Com Fast EtherLink/EtherLink XL PCI Busmaster NIC (3C905b) for the 10/100-Mbps NIC, and then click OK.**

9. **When prompted, remove the NIC driver diskette 2 from the diskette drive and reinsert it.**

10. **When the Setup Message confirms that the 3Com dRMON SmartAgent PC Software has been successfully installed, click OK.**

    The operating system continues copying the appropriate driver files.

11. **When the operating system has finished copying files from the NIC driver diskette 2, click Close in the Windows Welcome screen. Then click Close in the Network window.**

12. **If you are prompted to do so, enter information about your specific network.**

    See your network administrator for information.

13. **Click Yes in the Network Settings Change window to restart your system.**

Manually Configuring a 3Com PCI 3C905b NIC

The following subsections describe how to manually set the network frame type for an Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX)-compatible network protocol, which version of 3Com EtherDisk® XL drivers and utilities you

should use, and how to ensure that the NIC functions properly when you are installing the Japanese version of the Windows NT 4.0 operating system.

Setting the Network Frame Type

If your system is connected to a network, follow these steps:

1. **Right-click the Network Neighborhood icon on the Windows desktop, and click Properties in the pop-up menu.**
2. **Under the Configuration tab in the Network window, click IPX/SPX-compatible Protocol if it is not already selected.**
3. **Click Properties to open the IPX/SPX-compatible Protocol Properties window.**
4. **Click the Advanced tab, and then select Frame Type from the Property list.**
5. **Select the appropriate frame type (according to your network requirements) from the Value menu, and click OK.**
6. **Follow the instructions on your screen to complete the configuration.**

Using 3Com EtherDisk XL Version 3.01 Diskettes

The 3Com EtherDisk XL version 3.01 diskettes provided by Dell are compatible with the 3C905 family of NICs. If you purchased a 3Com 3C905-based NIC separately, do not attempt to use the 3Com EtherDisk XL diskettes that came with the NIC. Use only the 3Com EtherDisk XL version 3.01 diskettes that were provided by Dell.

Installing 3Com EtherDisk XL With Japanese Windows NT 4.0

If you are installing Japanese Windows NT 4.0 for the first time, follow the steps in "First-Time Installation." If Dell installed the Japanese version of Windows NT 4.0 Service Pack 3 and you need to reinstall 3Com EtherDisk XL, follow the steps in "Reinstallation."

First-Time Installation

If Dell did not install Japanese Windows NT 4.0, or if you are installing Windows NT 4.0 on a formatted or blank hard-disk drive, follow these steps:

1. **Install Windows NT 4.0.**

   For more information on installing Windows NT 4.0, see the *Dell-Installed Microsoft Windows NT Workstation 4.0 Setup Guide* and your operating system documentation.

2. **Install the Microsoft updated ATAPI driver for Windows NT 4.0.**

   For more information on installing Microsoft updated ATAPI driver, see Chapter 2, "Using the Software Support Utilities."

3. **Use 3Com EtherDisk XL version 3.01 to install the 3Com 3C905b NIC drivers.**

   For more information on installing 3Com 3C905b NIC drivers, see "Windows NT 4.0 NIC Driver."

4. **Install Service Pack 3 for Japanese Windows NT 4.0.**

   Use the Windows NT 4.0 CD that came with your system. For more information on installing Service Pack 3 for Windows NT 4.0, see your operating system documentation.

5. **Install video drivers and other system drivers.**

   For more information on installing video drivers and other system drivers and utilities, see the documentation that accompanied your graphics adapter and the appropriate chapter in this guide.

Reinstallation

If Dell already installed the Japanese version of Windows NT 4.0 Service Pack 3 and you need to reinstall 3Com EtherDisk XL version 3.01, follow these steps:

1. **Use the 3Com EtherDisk XL version 3.01 diskettes to reinstall the 3Com 3C905b NIC drivers.**

   For more information on reinstalling 3Com 3C905b NIC drivers, see "Windows NT 4.0 NIC Driver."

2. **Reinstall Service Pack 3 for Japanese Windows NT 4.0.**

   Use the Windows NT 4.0 CD that came with your system. For more information on reinstalling Service Pack 3 for Windows NT 4.0, see your operating system documentation.

3. **Reinstall video drivers and other necessary drivers.**

   For more information on reinstalling video drivers and other system drivers and utilities, see the documentation that accompanied your graphic adapter and the appropriate chapter in this guide.

CHAPTER 6
Using the Integrated Audio Controller

This chapter describes how to connect your computer system to external audio devices that use the 16-bit integrated audio controller on your computer's system board.

The integrated Crystal 4237B controller is Sound Blaster Pro-compatible and supports the Windows Sound System. The 4237B controller has a Sound Retrieval System (SRS) 3D stereo digital signal processing (DSP) engine that retrieves and restores spacial sound information, directional cues, and other sonic nuances that are typically missing or are altered by electronic reproduction of stereo sound.

This chapter also describes the audio application programs that Dell has installed on your hard-disk drive, and it tells you how to reinstall audio drivers if necessary.

NOTE: The instructions in this chapter apply to systems using the integrated audio controller. If you are using a sound card, use the connection instructions in the documentation that came with your sound card.

Connecting Audio Devices

You can connect a variety of audio devices to your computer. Use Figure 6-1 to locate the audio connectors on the input/output (I/O) panel on the back of your computer.

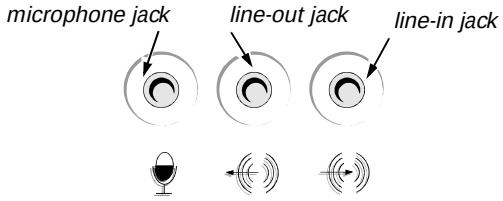


Figure 6-1. Audio Connectors

Before using any audio device, be sure that Sound in the System Setup program is set to On (the default). For instructions, see Chapter 3, "Using the System Setup Program."

Speakers

Your computer system supports most standard speakers that have integrated amplifiers. You can purchase speakers separately from Dell.

Connect the audio cable from the speakers to the line-out jack (see Figure 6-1).

NOTE: When speakers are attached to the line-out jack and Sound and Speaker in the System Setup program are set to On, sounds generated by the system and sounds generated by the integrated audio controller are heard through the external speakers and the computer's on-board speaker. If Sound in the System Setup program is set to Off, no sounds are emitted from any attached external speakers or from the on-board speaker, except for beep codes. If Speaker in the System Setup program is set to Off, the on-board speaker does not transmit sounds generated by the system (other than beep codes), but any attached external speakers do transmit these sounds. For more information, see "Sound" and "Speaker" in Chapter 3.

Microphones

Your computer system supports most standard personal computer microphones. You can purchase a microphone separately from Dell.

Connect the audio cable from the microphone to the microphone jack (see Figure 6-1).

Record/Playback Devices

Your computer system supports a variety of record/playback devices such as cassette players, CD players, radios, stereo systems, video cassette recorders (VCRs), and tape players.

Connect the line-out cable from any one of these devices to the line-in jack on the back of your computer (see Figure 6-1).

CD-ROM Drives

To use an internal CD-ROM drive with the integrated audio controller, do the following:

1. **Install the CD-ROM drive in your computer.**

   For instructions on installing a CD-ROM drive that uses the computer's enhanced integrated drive electronics (EIDE) interface, see "Installing a Drive in a 5.25-Inch Drive Bay" in Chapter 10.

   For instructions on installing a small computer system interface (SCSI) CD-ROM drive, see "Installing SCSI Devices" in Chapter 10.

2. **Connect the audio cable from the CD-ROM drive to the CD-ROM drive audio interface connector (labeled "CD-IN") on the system board.**

   See Figure 9-1 for the location of the CD-IN connector on the system board.

NOTES: The integrated audio controller allows you to manipulate musical instrument digital interface (MIDI) files on your computer and to hear output from those files on external speakers. However, to communicate with an external MIDI device, such as a synthesizer or other musical instrument, you must install a MIDI-compatible expansion card. (For instructions, see "Installing an Expansion Card" in Chapter 9.) If you use a MIDI card, set Sound in the System Setup program to Off. (See Chapter 3, "Using the System Setup Program," for information on changing System Setup settings.)

To use a joystick, install a joystick-compatible expansion card in your computer. (For instructions, see "Installing an Expansion Card" in Chapter 9.) If you use a joystick card with sound capabilities, set Sound in the System Setup program to Off. (See Chapter 3, "Using the System Setup Program," for information on changing System Setup settings.)

Adjusting Volume

Use the instructions in one of the following subsections to adjust the speaker balance and volume of an audio source that uses the integrated audio controller in your Dell computer.

Adjusting Volume in Windows NT 4.0

Use the following procedure to adjust the speaker or headphone volume in the Windows NT 4.0 operating system:

1. **Start the Audio Mixer utility located in the Audio Control program folder.**
2. **Adjust the slide controls labeled "Master" to adjust the volume and balance for all devices, or adjust the slide controls for an individual device.**

For detailed instructions on adjusting the volume, see your Windows NT documentation.

Muting the Internal Speaker

To mute the internal speaker, follow these steps:

1. **Start the Windows NT operating system.**
2. **Double-click the speaker icon in the right corner of the taskbar.**
3. **From the Master Out panel, click Advanced Controls in the Options menu.**
4. **Click the Advanced button under the Master Out column.**
5. **Click the PC Speaker Mute check box.**

Adjusting 3D Sound

The 4237B 3D sound system contains two controls—a space control and a center control—for adjusting the spatial effect of sound played through speakers connected to your computer. Turning up the level of the space control increases the amount of corrected directional information, restores the proper localization of the original sounds, and expands the width of the overall sound stage. Turning down the level of the space control decreases these effects. Always adjust the space control before adjusting the center control. Turning up the center control emphasizes centered sounds (typically vocals, solo instruments, bass, and kick drums in a musical recording) so that their intensity appears increased and they are brought into the center of the room.

To adjust the space and center controls, follow these steps:

1. **Start the Windows NT operating system.**
2. **Click right on the blue circle icon in the lower-right corner of the taskbar.**
3. **Click the Enabled check box in the control panel that appears.**
4. **Slide the Space and Center control slide switches until you achieve the desired effect.**

Using Audio Utilities

The Windows NT 4.0 operating system installed on your Dell system has its own utilities for playing audio CDs and manipulating **.wav** files. Use Audio Input to control the input of devices from which you are recording **.wav** data. Use Audio Mixer to adjust sound levels from several different audio sources.

Installing Audio Drivers

Your system's audio drivers were installed at Dell and are operative when you receive the system—no further installation or configuration is needed. The following subsections provide instructions on reinstalling these drivers if necessary.

Audio Drivers for Windows NT 4.0

To reinstall the audio drivers for Windows NT 4.0, follow these steps:

1. **Use the Program Diskette Maker (located in the Dell Accessories folder) to make a diskette copy of the audio drivers installed on your hard-disk drive.**
2. **Start the Windows NT 4.0 operating system.**
3. **Insert the Windows NT 4.0 audio drivers diskette into drive A.**
4. **Click the Start button, point to Settings, and click Control Panel.**

5. **Double-click the Multimedia icon.**

6. **In the Multimedia Properties window, click the Devices tab and then click Add.**

7. **In the Add dialog box, select Unlisted or Updated Driver and click OK.**

8. **In the Install Driver dialog box, type** `a:\` **and click OK.**

9. **In the Add Unlisted or Updated Driver dialog box, select CrystalWare Audio Driver NT and click OK.**

After the drivers have been installed, there will be a new Audio Control program folder with two programs—Audio Mixer and Audio Input.

CHAPTER 7
Using the Integrated SCSI Controllers

This chapter provides instructions for installing drivers for the following SCSI controllers:

- Integrated Adaptec 7890 Ultra2/Wide low voltage differential (LVD) small computer system interface (SCSI) controller. This primary controller provides transfer rates of up to 80 megabytes per second (MB/sec) with LVD hard-disk drives and up to 40 MB/sec with non-LVD hard-disk drives. The chassis supports up to four hard-disk drives of either type or a mix of both types.
- Adaptec 7880 Ultra/Wide external and narrow internal SCSI controller. This secondary controller provides transfer rates of up to 40 MB/sec and is used for removable media devices such as CD-ROM drives and tape drives. This controller also supports up to 15 external SCSI devices through a 68-pin connector on the computer's back panel. The chassis supports up to three SCSI removable-media devices.

NOTES: To achieve 80-MB/sec data transfer rates on the primary SCSI channel, you must use LVD hard-disk drives and either an LVD terminator or a multimode terminator.

If you install a mix of LVD and non-LVD hard-disk drives, the system can only achieve 40-MB/sec data transfer rates for all SCSI drives. In addition, the LVD drives in this mix must be capable of reverting to 40 MB/sec. In this configuration, you can terminate the SCSI subsystem with either a single-ended or multimode terminator.

Dell ships multimode terminators only, regardless of system configuration.

The total length of the SCSI cable for the secondary SCSI channel is 2.5 meters (m) for four attached devices.

The total number of SCSI devices connected to the secondary 7880 controller, both internally and externally, cannot exceed 15.

SCSI Device Considerations

The 5.25-inch externally accessible drive bays at the front of the computer are normally used for non-hard-disk drive devices such as CD-ROM drives and/or tape drives. These can be enhanced integrated drive electronics (EIDE) or SCSI devices.

CAUTION: Your hard-disk drive subsystem must consist of either SCSI hard-disk drives or EIDE hard-disk drives. Dell does not support a mix of both types of hard-disk drives.

The four internal drive bays (located in the drive cage beneath the externally accessible drive bays; see Figure 7-1) are used for either SCSI hard-disk drives or EIDE hard-disk drives. Internal hard-disk drives are mounted vertically in a removable drive bracket that can contain up to four 1-inch hard-disk drives or up to two 1-inch and two 1.6-inch hard-disk drives.

NOTE: Dell supports only the drives it furnishes.

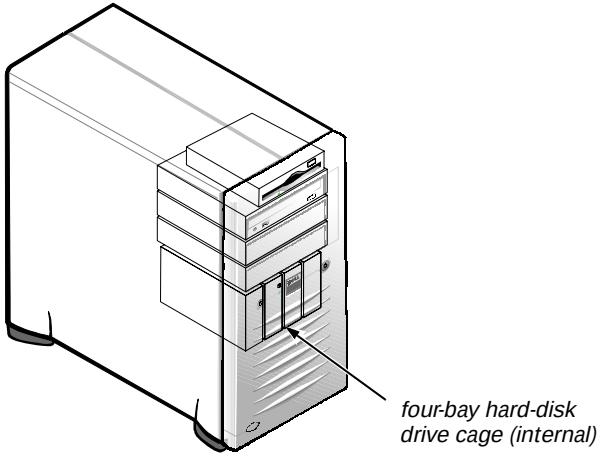


Figure 7-1. Internal Drive Bays

For detailed information about installing drives in either the externally accessible drive bays or the internal drive bays, see Chapter 10, "Installing Drives."

Installing SCSI Drivers

Your system's SCSI drivers were installed at Dell and are operative when you receive the system—no further installation or configuration is needed. The following subsections provide instructions on reinstalling these drivers. Repeat the procedure for each SCSI driver you want to install.

SCSI Drivers for Windows NT 4.0

To reinstall the SCSI drivers for Windows NT 4.0, follow these steps:

1. **Use the Program Diskette Maker (located in the Dell Accessories folder) to make a diskette copy of the SCSI drivers installed on your hard-disk drive.**
2. **Start the WIndows NT operating system.**
3. **Click the Start button, point to Settings, and click Control Panel.**
4. **Double-click SCSI Adapters.**
5. **Click the Drivers tab and click the Add button.**
6. **In the Install Driver window, click the Have Disk button.**
7. **Insert the Windows NT 4.0 SCSI drivers diskette into drive A.**
8. **In the text field labeled "Copy manufacturer's files from," type** `a:\` **and click Continue.**
9. **After the driver has been installed, remove the diskette from drive A and restart Windows NT 4.0.**

Installing SCSI Drivers During Windows NT 4.0 Installation

Follow these steps to install SCSI drivers during Windows NT 4.0 installation:

1. **Insert the bootable Windows NT CD, and turn on or reboot the system.**
2. **Press <F6> when the following message appears:**

   ```
   Setup is inspecting your computer's hardware
   configuration...
   ```

   The setup program copies files to your system and pauses at the Windows NT Setup screen to allow you to specify additional devices.

3. **Press <s> to specify additional SCSI devices.**

   Windows NT displays a list of supported host adapters.

4. **Select Other (the default) and press <Enter>.**

   The following message appears:

   ```
   Please insert the disk labeled Manufacturer-supplied hard-
   ware support disk into Drive A:
   ```

5. **Insert the diskette containing the Adaptec 7890 and 7880 device drivers and press <Enter>.**

   You created this diskette using the Dell DiskMaker program when you made program diskette sets of your Dell-installed software.

6. **Follow the instructions on the screen to complete the Windows NT installation.**

CHAPTER 8
Working Inside Your Computer

Your Dell Precision 610 system supports a variety of internal options that expand system capabilities. This chapter prepares you to install options inside the computer. It describes how to remove and replace the computer cover and rotate the power supply away from the system board. It also familiarizes you with the internal components you may handle if you install Dell hardware options.

Before You Begin

To make working inside your computer easier, make sure you have adequate lighting and a clean work space. If you temporarily disconnect cables or remove expansion cards, note the position of the connectors and slots so that you can reassemble the system correctly.

You will use the information in this section every time you install a hardware option inside your computer. *Read this section carefully*, because the information is not repeated in detail elsewhere in this guide.

Safety First—For You and Your Computer

Working inside your computer is safe—*if* you observe the following precautions.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF YOUR EQUIPMENT

Before starting to work on your computer, perform the following steps in the sequence indicated:

1. **Turn off your computer and all peripherals.**
2. **Disconnect your computer and peripherals from their AC power sources. Also, disconnect any telephone or telecommunication lines from the computer. Doing so reduces the potential for personal injury or shock and damage to system components.**

3. **If you are disconnecting a peripheral from the computer or are removing a component from the system board, wait 10 to 20 seconds after disconnecting the computer from AC power before disconnecting the peripheral or removing the component to avoid possible damage to the system board.**

   To verify that all power has been removed from the system, make sure that the standby light-emitting diode (LED) on the system board has gone out. For the location of this LED, see Figure 9-1.

4. **Touch an unpainted metal surface on the computer chassis, such as the power supply, before touching anything inside your computer.**

   While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components. Also avoid touching components or contacts on a card and avoid touching pins on a chip.

In addition, Dell recommends that you periodically review the safety instructions at the front of this guide.

Unpacking Your Hardware Option

When you remove an option from its shipping carton, you may find it wrapped in antistatic packing material designed to protect it from electrostatic damage. Do not remove the packing material until you are ready to install the option.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

Removing the Computer Cover

Use the following procedure to remove the computer cover:

1. **Turn off your computer and peripherals, and make sure you unplug the computer from its electrical outlet before you remove the computer cover. Observe the *Warning for Your Personal Safety and Protection of Your Equipment* described earlier in this chapter. Also observe the safety instructions at the front of this guide.**

2. **If you have installed a padlock through the padlock ring on the back panel (see Figure 8-1), remove the padlock.**

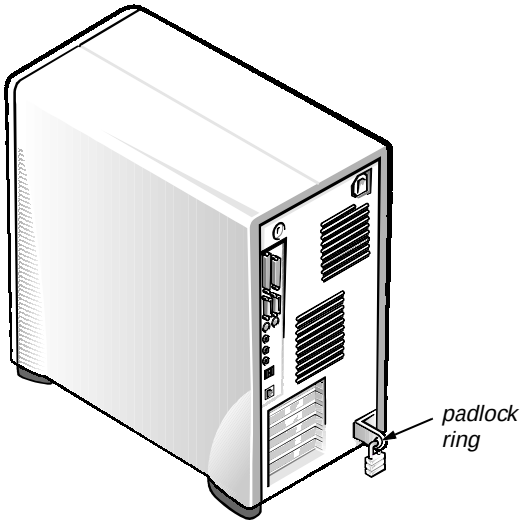


Figure 8-1. Padlock Installed

3. Remove the cover.

Facing the left side cover, press the release button (located at the bottom-left corner of the front bezel) and lift the bottom of the cover, allowing it to pivot up toward you (see Figure 8-2).

Disengage the tabs that secure the cover to the top of the chassis, and lift the cover away.

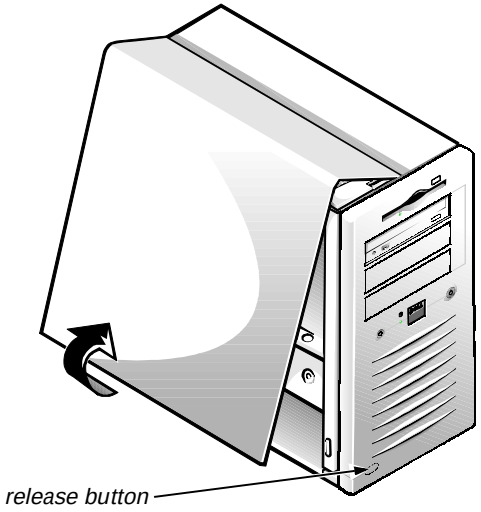


Figure 8-2. Removing the Computer Cover

Replacing the Computer Cover

Use the following procedure to replace the computer cover:

1. **Check all cable connections, especially those that might have come loose during your work. Fold cables out of the way so that they do not catch on the computer cover. Make sure cables are not routed over the drive cage—they will prevent the cover from closing properly.**

2. **Check to see that no tools or extra parts (including screws) are left inside the computer's chassis.**

3. **Replace the cover.**

   Facing the left side of the computer, hold the cover at a slight angle as shown in Figure 8-3, and then align the top of the cover with the top of the chassis. Hook the tabs on the cover into the recessed slots on the computer chassis so that the tabs catch the hooks inside the slots.

   Pivot the cover down toward the bottom of the chassis and into position. Make sure the securing hooks at the bottom of the cover click into place.

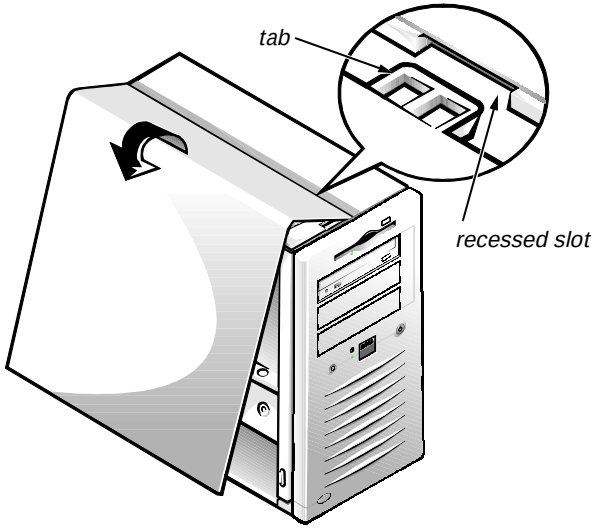


Figure 8-3. Replacing the Computer Cover

4. **If you are using a padlock to secure your system, reinstall the padlock.**

NOTE: After removing and replacing the chassis, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

5. **Reset the chassis intrusion detector by entering the System Setup program and setting Chassis Intrusion to Not Detected.**

See Chapter 3, "Using the System Setup Program," for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

Inside Your Computer

Figure 8-4 shows a side view of your computer to help you orient yourself when installing hardware options. Unless otherwise specified, locations or directions relative to the computer are as shown.

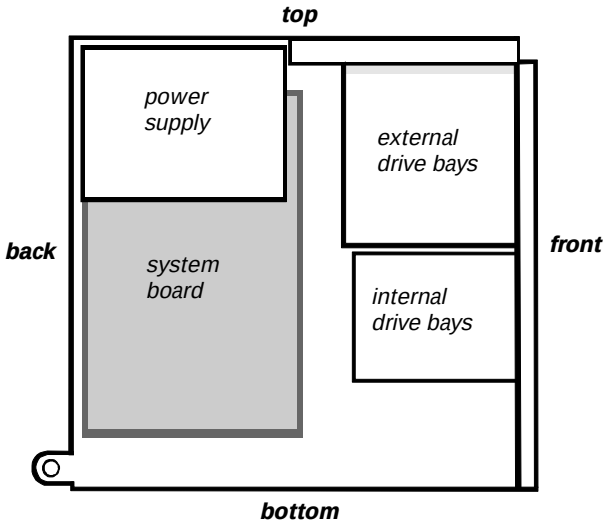


Figure 8-4. Computer Orientation View

Figure 8-5 shows your computer with its cover removed. Refer to this illustration to locate interior features and components discussed in this guide.

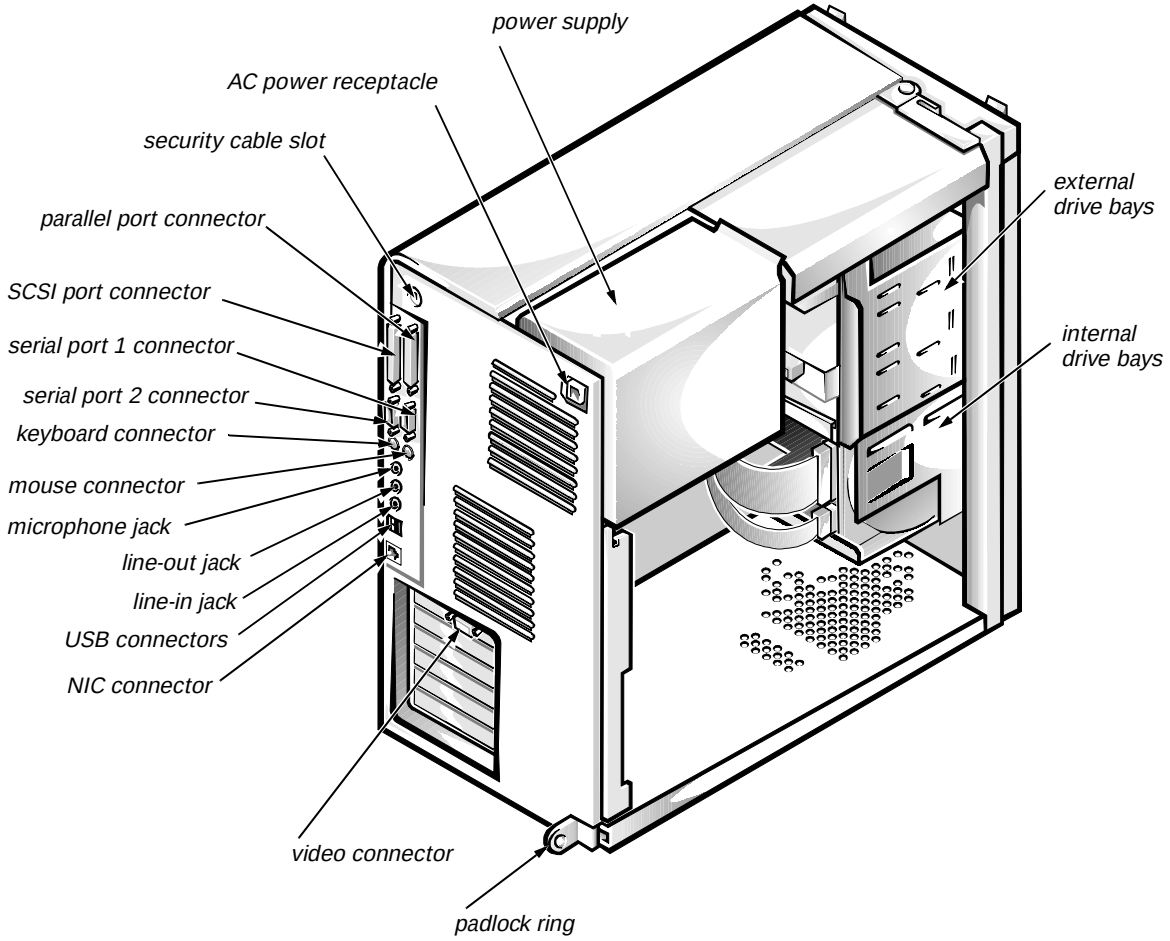


Figure 8-5. Inside the Chassis

Rotating the Power Supply Away From the System Board

To access some components on the system board, you may have to rotate the system power supply out of the way. Use the following procedure to rotate the power supply:

1. **Remove the computer cover as instructed in "Removing the Computer Cover" found earlier in this chapter.**

2. **Disconnect the AC power cable from the AC power receptacle on the back of the power supply (see Figure 8-6).**

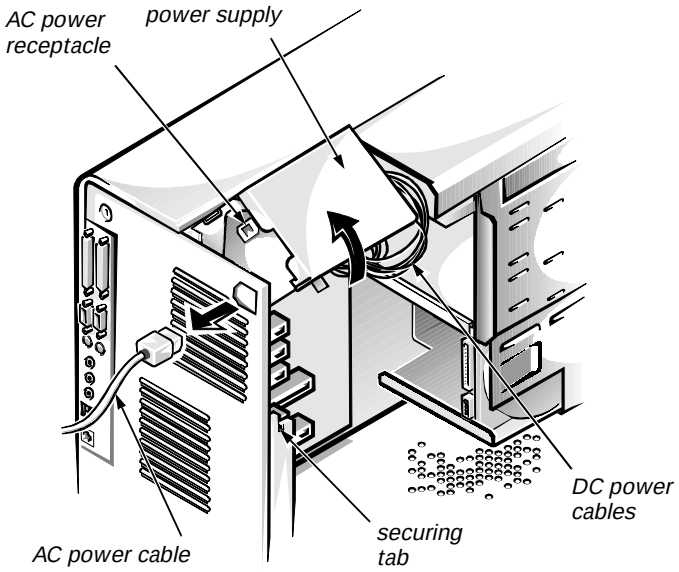


Figure 8-6. Rotating the Power Supply

3. **Free the power supply by pressing the securing tab labeled "RELEASE —>," then rotate the power supply upward until it locks in one of its extended positions.**

   The power supply bracket has detents to hold the power supply up in one of several extended positions, which are especially useful when the chassis is standing upright.

CHAPTER 9
Installing System Board Options

This chapter describes how to install the following options:

- Peripheral Component Interconnect (PCI), accelerated graphics port (AGP), and Industry-Standard Architecture (ISA) expansion cards
- System memory
- Processor Slot 2 single-edge contact (Slot 2 SEC) cartridge

This chapter also includes instructions for replacing the system battery, if necessary.

Use Figure 9-1 to locate the system board features.

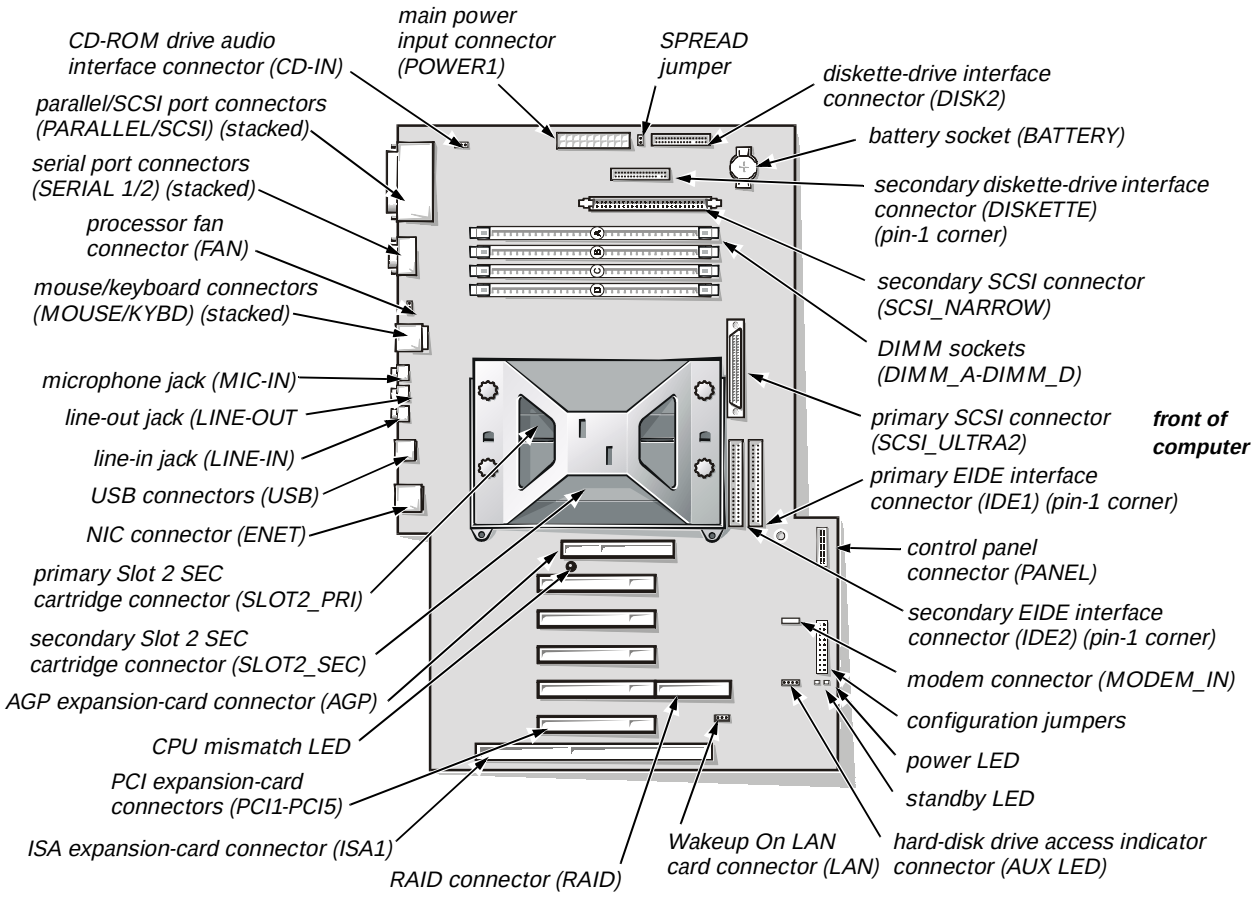

CD-ROM drive audio interface connector (CD-IN)
main power input connector (POWER1)
SPREAD jumper
diskette-drive interface connector (DISK2)
parallel/SCSI port connectors (PARALLEL/SCSI) (stacked)
battery socket (BATTERY)
serial port connectors (SERIAL 1/2) (stacked)
secondary diskette-drive interface connector (DISKETTE) (pin-1 corner)
processor fan connector (FAN)
secondary SCSI connector (SCSI_NARROW)
mouse/keyboard connectors (MOUSE/KYBD) (stacked)
DIMM sockets (DIMM_A-DIMM_D)
microphone jack (MIC-IN)
primary SCSI connector (SCSI_ULTRA2)
front of computer
line-out jack (LINE-OUT
line-in jack (LINE-IN)
primary EIDE interface connector (IDE1) (pin-1 corner)
USB connectors (USB)
NIC connector (ENET)
control panel connector (PANEL)
primary Slot 2 SEC cartridge connector (SLOT2_PRI)
secondary EIDE interface connector (IDE2) (pin-1 corner)
secondary Slot 2 SEC cartridge connector (SLOT2_SEC)
modem connector (MODEM_IN)
AGP expansion-card connector (AGP)
configuration jumpers
CPU mismatch LED
power LED
PCI expansion-card connectors (PCI1-PCI5)
standby LED
ISA expansion-card connector (ISA1)
Wakeup On LAN card connector (LAN)
hard-disk drive access indicator connector (AUX LED)
RAID connector (RAID)

Figure 9-1. System Board Features

Expansion Cards

The system accommodates up to six expansion cards, including 32-bit PCI expansion cards, an 8- or 16-bit ISA expansion card, and a 32-bit AGP card. (See Figure 9-2 for examples of these cards.)

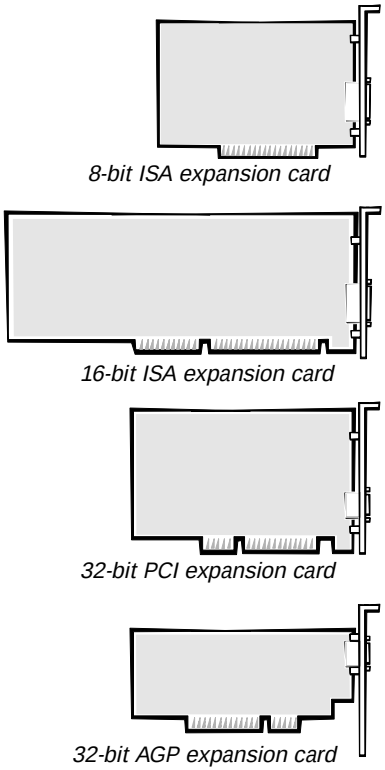


Figure 9-2. Expansion Cards

Expansion Slots

There are seven expansion-card connectors on the system board. Expansion-card connectors PCI1 through PCI5 support 32-bit PCI expansion cards; expansion-card connector AGP supports a 32-bit AGP expansion card; and expansion-card connector ISA1 can accommodate an 8- or 16-bit ISA expansion card.

NOTES: Connector ISA1 shares expansion-slot space with connector PCI5. Therefore, only one card of either type can be installed in this slot.

PCI4 has a connector extension to support a PCI RAID controller (see Figure 9-1).

Installing an Expansion Card

Follow this general procedure to install an expansion card:

1. **If you are installing a non-Plug and Play ISA expansion card, enter the ISA Configuration Utility (ICU) and add the new expansion card to your configuration.**

   See Chapter 4, "Using the ISA Configuration Utility," for instructions.

   NOTE: If you install a PCI or Plug and Play expansion card, your system automatically performs any required configuration tasks during the boot routine.

2. **Prepare the expansion card for installation, and remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 8.**

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

   See the documentation that came with the expansion card for information on configuring the card, making internal connections, or otherwise customizing it for your system.

   CAUTION: Some network cards automatically start up the system when they are connected. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any expansion cards.

3. **Unscrew and remove the metal filler bracket that covers the card-slot opening for the expansion slot you intend to use (see Figure 9-3).**

   Save the screw to use when installing the expansion card later in this procedure.

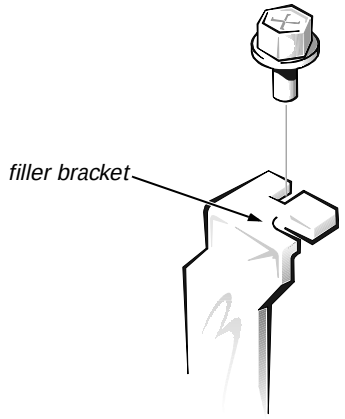


Figure 9-3. Removing the Filler Bracket

4. **Insert the expansion card into the expansion-card connector.**

   If the expansion card is full-length, insert the front end of the card into the corresponding card guide on the inside front of the chassis as you insert the card into its connector.

   Insert the card's edge connector firmly into the expansion-card slot. Gently rock the card into the connector until it is fully seated (see Figure 9-4).

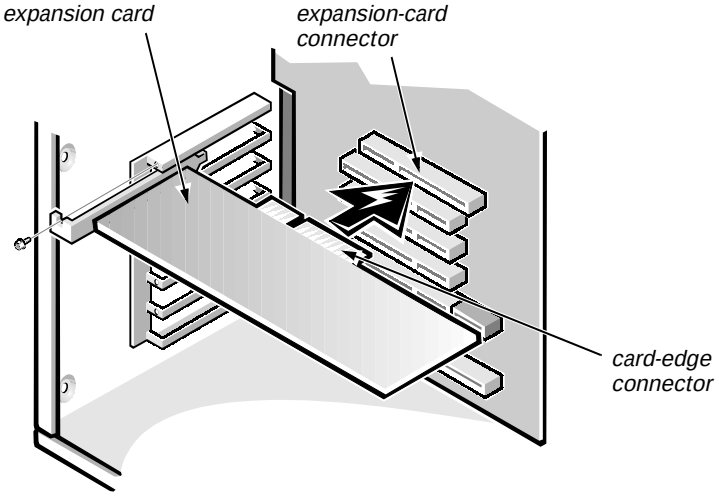


Figure 9-4. Installing an Expansion Card

5. **When the card is firmly seated in the connector, secure the card's mounting bracket to the chassis with the screw you removed in step 3.**

6. **Connect any cables that should be attached to the card.**

   See the documentation that came with the card for information about the card's cable connections.

7. **Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.**

NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

8. **To reset the chassis intrusion detector, enter the System Setup program and reset Chassis Intrusion to Not Detected.**

   See Chapter 3, "Using the System Setup Program," for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

Removing an Expansion Card

Follow this general procedure to remove an expansion card:

1. **If you are removing a non-Plug and Play ISA expansion card, enter the ICU and remove the expansion card from your configuration.**

   See Chapter 4, "Using the ISA Configuration Utility," for instructions.

2. **Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 8.**

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. **If necessary, disconnect any cables connected to the card.**
4. **Unscrew the mounting bracket of the card you want to remove.**
5. **Grasp the card by its outside corners, and ease it out of its connector.**
6. **If you are removing the card permanently, install a metal filler bracket over the empty card-slot opening.**

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of your computer.

7. **Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.**

NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

8. **To reset the chassis intrusion detector, enter the System Setup program and reset Chassis Intrusion to Not Detected.**

   See Chapter 3, "Using the System Setup Program," for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

Adding Memory

Dell Precision 610 systems can use unbuffered or registered synchronous dynamic random-access memory (SDRAM) modules that provide error checking and correction (ECC) capabilities.

System memory can be increased up to 512 megabytes (MB) using unbuffered SDRAM dual in-line memory modules (DIMMs) or up to 2048 MB using registered SDRAM DIMMs (see Tables 9-1 and 9-2). Unbuffered and registered SDRAM DIMMs cannot be mixed.

Figure 9-5 shows the DIMMs and DIMM sockets.

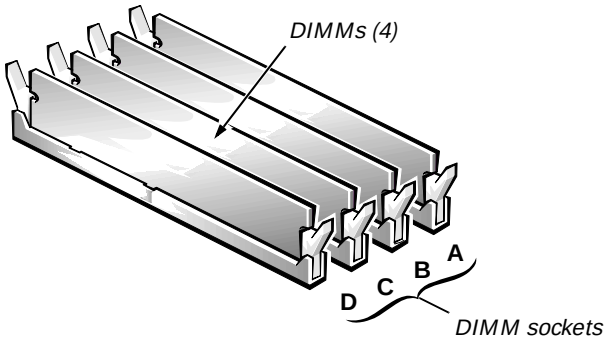


Figure 9-5. DIMMs and DIMM Sockets

DIMM Installation Guidelines

When adding system memory, you may install DIMMs in any order. For optimum operation, Dell recommends installing the DIMMs starting with socket A (closest to the top edge of the system board) and working toward socket D, leaving no open sockets between installed DIMMs.

Tables 9-1 and 9-2 list sample memory configurations.

Table 9-1. Sample Unbuffered SDRAM DIMM Configuration Options

Total Desired Memory	DIMM Socket			
	A	B	C	D
64 MB	32 MB	32 MB		
64 MB	64 MB			
96 MB	32 MB	32 MB	32 MB	
128 MB	32 MB	32 MB	32 MB	32 MB
192 MB	64 MB	64 MB	32 MB	32 MB
256 MB	128 MB	128 MB		
384 MB	64 MB	64 MB	128 MB	128 MB
512 MB	128 MB	128 MB	128 MB	128 MB

Table 9-2. Sample Registered SDRAM DIMM Configuration Options

Total Desired Memory	DIMM Socket			
	A	B	C	D
256 MB	256 MB			
512 MB	256 MB	256 MB		
768 MB	256 MB	256 MB	256 MB	
1024 MB	256 MB	256 MB	256 MB	256 MB
2048 MB	512 MB	512 MB	512 MB	512 MB

Follow this procedure to perform a memory upgrade:

1. **Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 8.**

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

2. **To access the DIMM sockets on the system board, rotate the power supply as described in "Rotating the Power Supply Away From the System Board" in Chapter 8.**

3. **Determine the DIMM sockets in which you will install DIMMs or replace existing DIMMs.**

4. **Install or replace DIMMs as necessary to reach the desired memory total.**

   Follow the instructions in "Installing a DIMM" or "Removing a DIMM," as appropriate, found later in this section.

5. **Rotate the power supply back into position, making sure the securing tab snaps into place.**

6. **Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.**

NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

The system detects that the new memory does not match the existing system configuration information and generates the following message:

```
The amount of system memory has changed.
Strike the F1 key to continue, F2 to run the setup utility
```

7. **Press <F2> to enter the System Setup program, and check the value for System Memory in the lower-right corner of Page 1.**

   The system should have already changed the value of System Memory to reflect the newly installed memory. Verify the new total.

NOTE: If the memory total is incorrect, turn off and disconnect your computer and peripherals from their power sources. Remove the computer cover, rotate the power supply, and check the installed DIMMs to make sure that they are seated properly in their sockets. Then repeat steps 5, 6, and 7.

8. **While in the System Setup program, reset the chassis intrusion detector by changing Chassis Intrusion to Not Detected.**

   See Chapter 3, "Using the System Setup Program," for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

9. **When the System Memory total is correct, press the <Esc> key to exit the System Setup program.**

10. **Run the Dell Diagnostics to verify that the DIMMs are operating properly.**

    See your *Diagnostics and Troubleshooting Guide* for information on running the diagnostics and troubleshooting any problems that may occur.

Installing a DIMM

If a DIMM is already installed in the socket you want to use, you must remove it. To do so, follow the instructions in the next subsection, "Removing a DIMM."

Use the following procedure to install a DIMM (see Figure 9-6):

1. **Locate the plastic securing clips at each end of the socket. Press the clips outward until they snap open.**

2. **Press the DIMM straight into the slot running down the center of the socket until the securing tabs snap into place around the ends of the DIMM.**

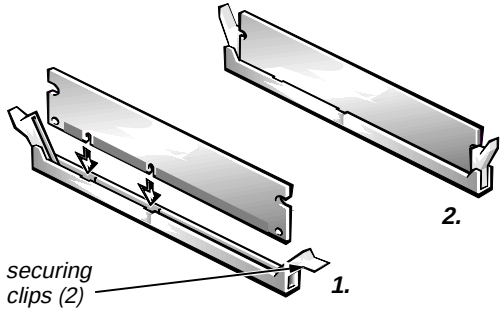


Figure 9-6. Installing a DIMM

Removing a DIMM

To remove a DIMM, press the securing clips outward simultaneously until the DIMM disengages from the socket (see Figure 9-7). It should pop out slightly.

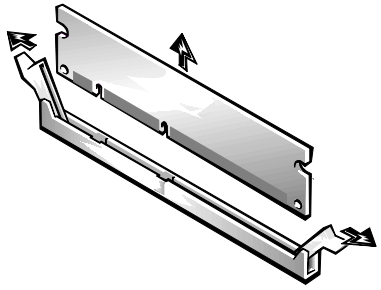


Figure 9-7. Removing a DIMM

Pentium II Xeon Processor Upgrades

To take advantage of future options in speed and functionality, you can add a second Pentium II Xeon processor or replace either the primary or secondary Pentium II Xeon processor.

CAUTION: The second Pentium II Xeon processor must be of the same type and speed as the first processor.

Each Pentium II Xeon processor and its associated L2 (level-2) cache memory are contained in a Slot 2 SEC cartridge that is installed in a dedicated connector on the system board. In systems with only one Pentium II Xeon processor, a terminator card is installed in the secondary processor connector. The following subsection describes how to install or replace a Slot 2 SEC cartridge in either the primary or secondary processor connector.

Adding or Replacing a Pentium II Xeon Processor

A Pentium II Xeon processor upgrade kit includes the new Pentium II Xeon processor Slot 2 SEC cartridge with attached heat sink.

Use the following procedure to add or replace a Slot 2 SEC cartridge.

NOTE: Dell recommends that only a technically knowledgeable person perform this procedure.

1. **Unplug the computer from its AC power source.**
2. **Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 8.**

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.
3. **Rotate the power supply as described in "Rotating the Power Supply Away From the System Board" in Chapter 8.**

   Be sure the system board standby LED is turned off. If the standby LED is turned on, the computer is not unplugged from its AC power source.
4. **If you are adding a second Pentium II Xeon processor to a single-Pentium II Xeon processor system, remove the terminator card from the secondary Slot 2 SEC cartridge connector (labeled "SLOT2_SEC").**

   Unscrew and remove the four large thumbscrews and top bracket that secure the heat sink and the Dell terminator card to the system board. Pull the terminator card straight out to remove it from the connector. Be sure that the power requirements for both processors match. Otherwise, the CPU mismatch LED will light up and the system will not turn on.
5. **If you are replacing an installed Pentium II Xeon processor, remove the current Slot 2 SEC cartridge/heat sink assembly from its connector.**

   Unscrew and remove the four large thumbscrews and top bracket that secure the heat sink to the system board. Grasp the Slot 2 SEC cartridge assembly firmly, and pull it away from the guide bracket assembly (see Figure 9-8). You must use up to 15 pounds (lb) of force to disengage the Slot 2 SEC cartridge from the connector. Repeat this step if you are also replacing a second Pentium II Xeon processor.

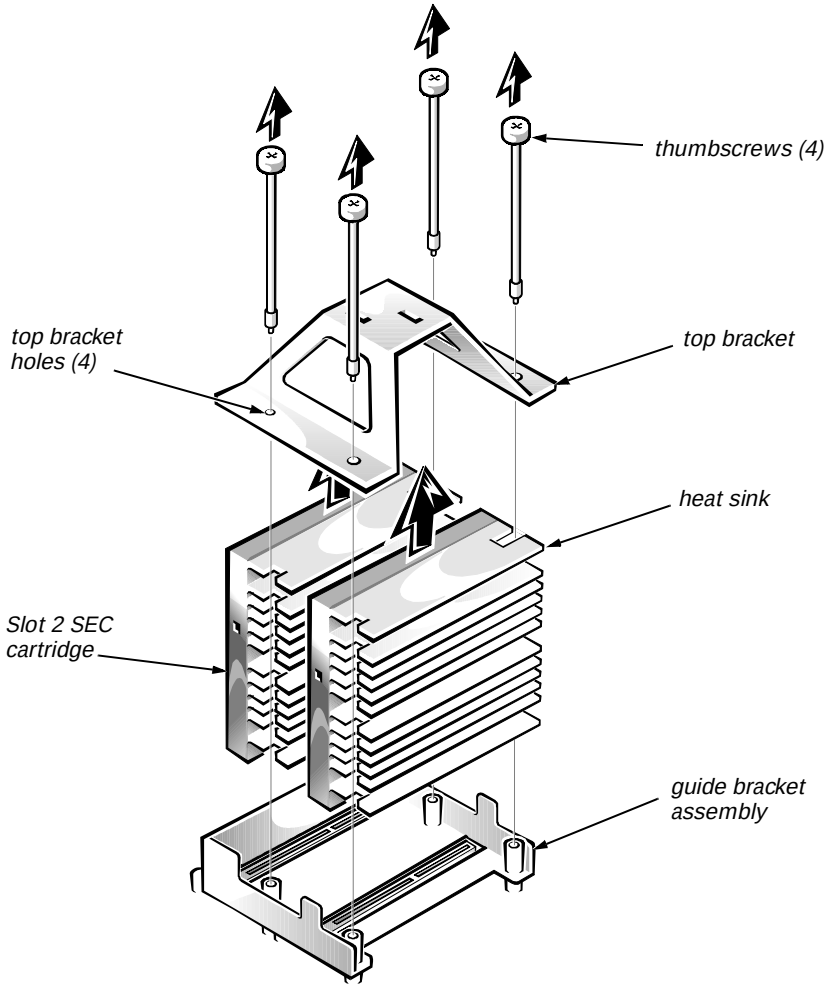


Figure 9-8. Slot 2 SEC Cartridge/Heat Sink Assembly Removal

6. Insert the new Slot 2 SEC cartridge/heat sink assembly into the system board connector.

Press the Slot 2 SEC cartridge firmly into its connector until it is fully seated. You must use up to 25 lb of force to fully seat the Slot 2 SEC cartridge in its connector. Install a second Slot 2 SEC cartridge/heat sink assembly into its connector, if desired. Place the top bracket on top of the Slot 2 SEC cartridge(s) (see Figure 9-8). Install or replace the four large thumbscrews through the top bracket holes and through the holes in the guide bracket assembly to secure the heat sink to the chassis.

NOTE: Both processor slots must be populated with either a Pentium II Xeon processor or a Dell terminator card. If a slot is not occupied, or if a non-Dell terminator card is installed, the system will not turn on.

7. **If necessary, change the processor speed jumper setting (see Figure B-1 to locate system board jumpers).**

   The processor speed jumper should be set for the installed processor's rated internal speed. For example, for a 400-megahertz (MHz) Intel Pentium II Xeon processor, a jumper plug should be installed on the pins labeled "400MHZ." (See Appendix B, "Hardware Configuration Features," for more information on the jumpers.) The processor speed jumper setting must not exceed the slowest internal speed of either processor.

8. **Rotate the power supply back into position, making sure that the securing tab snaps into place.**

9. **Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.**

   As the system boots, it detects the presence of the new processor and automatically changes the system configuration information in the System Setup program. The new processor's identification code number is also displayed in the CPU ID(s) category in the System Setup program. If you installed a second processor, two processor identification code numbers should be present in the CPU ID(s) category.

NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

10. **Enter the System Setup program, and confirm that the top line in the system data area correctly identifies the installed processor(s).**

    See Chapter 3, "Using the System Setup Program."

11. **While in the System Setup program, reset the chassis intrusion detector by changing Chassis Intrusion to Not Detected.**

    See Chapter 3, "Using the System Setup Program," for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

12. **If you installed a second processor and your system is running Windows NT 4.0, reinstall the operating system.**

    See your Windows NT documentation for instructions.

    When you reinstall Windows NT 4.0, the operating system detects the second processor.

13. **Run the Dell Diagnostics to verify that the new processor is operating correctly.**

    See your *Diagnostics and Troubleshooting Guide* for information on running the diagnostics and troubleshooting any problems that may occur.

Replacing the System Battery

A 3.0-V CR2032 coin-cell battery installed on the system board maintains system configuration, date, and time information in a special section of memory.

The operating life of the battery can extend up to 10 years. The battery may need replacing if an incorrect time or date is displayed during the boot routine along with a message such as:

```
Time-of-day not set – please run SETUP program
```

or

```
Invalid configuration information –
please run SETUP program
```

or

```
Strike the F1 key to continue,
F2 to run the setup utility
```

To determine whether the battery needs replacing, reenter the time and date through the System Setup program and exit the program properly to save the information. Turn off and unplug your system for a few hours, and then plug in and turn on your system. Enter the System Setup program. If the date and time are not correct in the System Setup program, replace your battery.

You can operate your system without a battery; however, without a battery, the system configuration information maintained by the battery is erased if the system is unplugged or AC power is lost. In this case, you must enter the System Setup program and reset the configuration options.

WARNING

WARNING: There is a danger of the new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Use the following procedure to replace the system battery with another CR2032 coin-cell battery:

1. **If you have not already done so, make a copy of your system configuration information in the System Setup program.**

   If the settings are lost while you are replacing the battery, you can refer to your written or printed copy of the system configuration information to restore the

correct settings. See Chapter 3, "Using the System Setup Program," for instructions.

2. **Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 8.**

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. **To access the battery on the system board, rotate the power supply as described in "Rotating the Power Supply Away From the System Board" in Chapter 8.**

NOTE: If a CD-ROM drive or hard-disk drive in the upper 5.25-inch drive bay obstructs your access to the battery, you may find it helpful to remove the front bezel and slide the drive forward slightly to provide more room for you to work. See the sections in Chapter 10 titled "Removing and Replacing the Front Bezel" and "Installing a Drive in a 5.25-Inch Drive Bay" for instructions.

4. **Locate the battery and remove it.**

The battery is mounted in a socket labeled "BATTERY" at the upper front-right corner of the system board (as you face the side of the system) (see Figure 9-1).

CAUTION: If you pry the battery out of its socket with a blunt object, be careful not to touch the system board with the object. Make certain that the object is inserted between the battery and the socket before attempting to pry out the battery. Otherwise, you may damage the system board by prying off the socket or by breaking circuit traces on the system board.

Pry the battery out of its socket with your fingers or with a blunt, nonconductive object, such as a plastic screwdriver (see Figure 9-9).

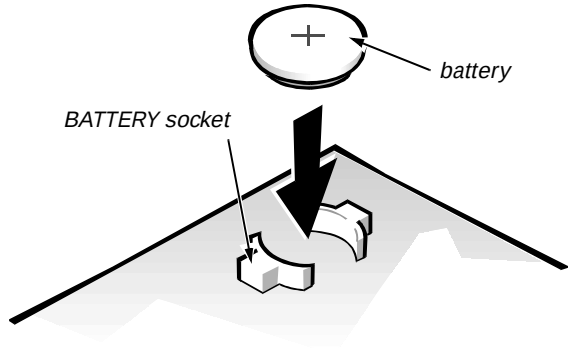


Figure 9-9. System Battery and Battery Socket

5. **Install the new battery.**

   Orient the battery with the side labeled "+" facing up. Then insert the battery into the socket, and snap it into place.

6. **Rotate the power supply back into position, making sure that the securing tab snaps into place.**

7. **Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.**

NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

8. **Enter the System Setup program, and confirm that the battery is operating properly.**

   See Chapter 3, "Using the System Setup Program," for information on running the System Setup program.

   Enter the correct time and date through the System Setup program's Time and Date options. Also, restore the correct settings for the system configuration information using the copy made in step 1, and then exit the System Setup program.

9. **While in the System Setup program, reset the chassis intrusion detector by changing Chassis Intrusion to Not Detected.**

   See Chapter 3, "Using the System Setup Program" for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

10. **Turn off your computer, and unplug it for at least 10 minutes.**

11. **After 10 minutes, plug in the computer, turn it on, and enter the System Setup program. If the time and date are still incorrect, see the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide* for instructions on obtaining technical assistance.**

CHAPTER 10
Installing Drives

Your Dell computer has eight drive bays for installing the following types of drives (see Figure 10-1):

- The externally accessible drive bays at the front of the computer consist of one 3.5-inch drive bay (dedicated to a 3.5-inch slimline diskette drive) and three 5.25-inch bays that can hold up to three half-height, 5.25-inch devices—typically tape drives or CD-ROM drives. Alternately, 3.5-inch devices can be installed in the 5.25-inch bays using adapters available from Dell.
- The four-bay hard-disk drive cage below the externally accessible bays can hold up to four 1-inch or up to two 1-inch and two 16-inch hard-disk drives installed vertically. The maximum number of hard-disk drives must be either two enhanced integrated drive electronics (EIDE) hard-disk drives or up to four small computer system interface (SCSI) hard-disk drives.

The next three sections contain information that you will need in several of the installation procedures described later in the chapter. The remaining sections of this chapter cover each type of drive installation.

*NOTE: In all of the following procedures, **left** and **right** refer to your left and right as you face the **front** of the computer.*

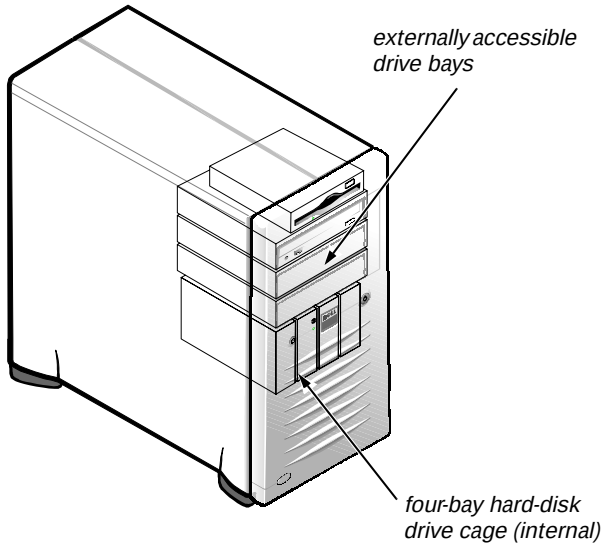


Figure 10-1. Drive Locations

Removing and Replacing the Front Bezel

The bezel is secured to the front of the chassis by two tabs and two hooks. The tab release for the bezel is at the top of the computer chassis and can be accessed only with the computer cover removed (see "Removing the Computer Cover" in Chapter 8). With the cover removed, release the bezel by pressing the tab release marked with the icon (see Figure 10-2).

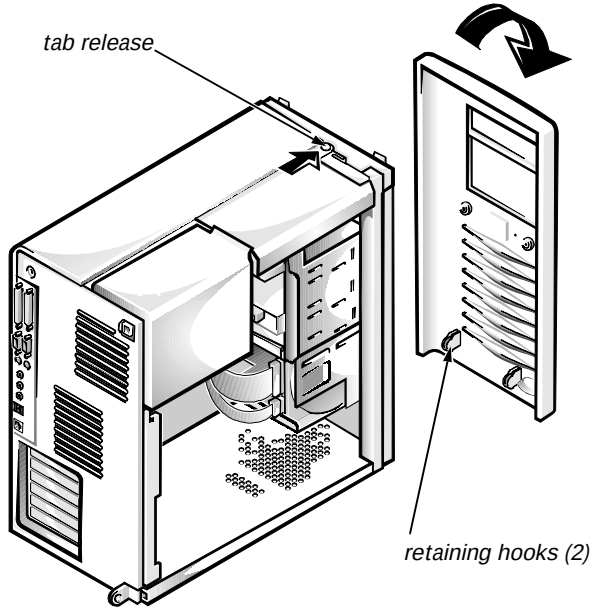


Figure 10-2. Removing the Front Bezel

While pressing the tab release, tilt the bezel away from the chassis, disengage the two retaining hooks at the bottom of the bezel, and carefully pull the bezel away from the chassis.

To replace the bezel, fit the two retaining hooks on the bezel into their corresponding slots at the bottom of the chassis. Then rotate the top of the bezel toward the chassis until the top tabs snap into their corresponding slots on the bezel.

Removing and Replacing Front-Panel Inserts

Empty drive bays contain a front-panel insert to protect the inside of the computer from dust particles and also to ensure proper airflow within the computer. Before you install a drive in an empty drive bay, you must first remove the front-panel insert.

To remove the insert covering a 5.25-inch bay, follow these steps:

1. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**
2. **Remove the computer cover as instructed in "Removing the Computer Cover" in Chapter 8.**
3. **Remove the front bezel using the instructions in the previous section, "Removing and Replacing the Front Bezel."**

4. **With your thumbs, press in on each end of the insert until the insert snaps free of the bezel (see Figure 10-3).**

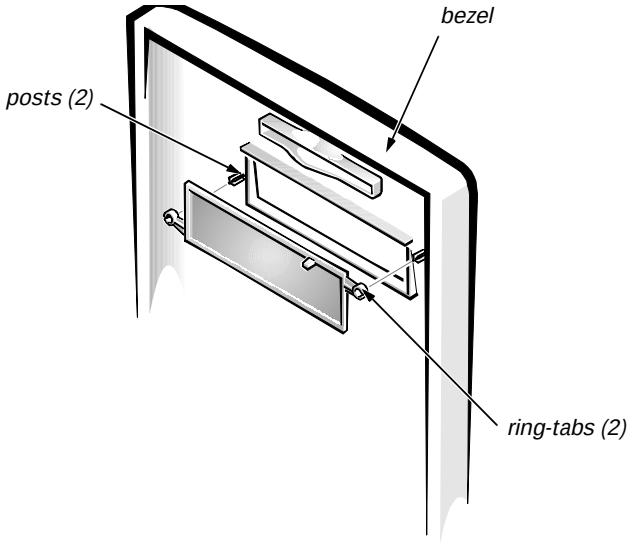


Figure 10-3. Removing the Front-Panel Insert for a 5.25-Inch Bay

To replace a front-panel insert for a 5.25-inch bay, work from inside the bezel. Insert the two ring-tabs (one on each end of the insert) over the posts on the inside of the bay opening, and firmly press both ends of the insert into place (see Figure 10-3).

Connecting Drives

When installing a drive, you connect two cables—a DC power cable and an interface cable—to the back of the drive. Your drive's power input connector (to which you connect the DC power cable) resembles the connector shown in Figure 10-4.

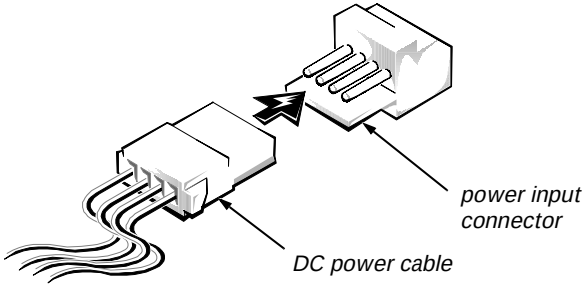


Figure 10-4. DC Power Cable Connector

The drive's interface connector is a card-edge connector or a header connector, as shown in Figure 10-5.

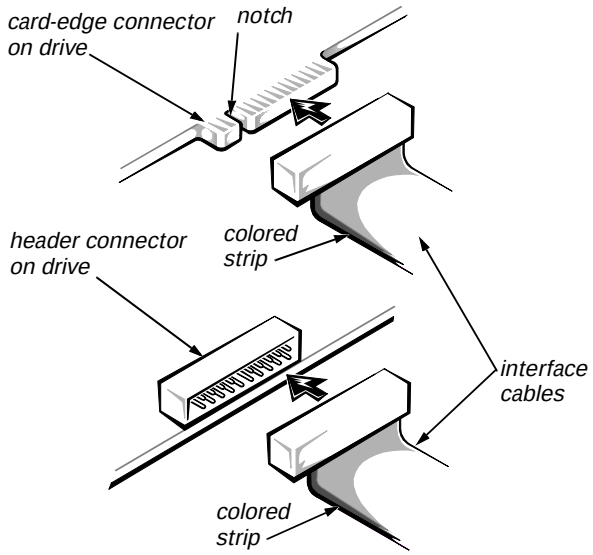


Figure 10-5. Drive Interface Connectors

When attaching the interface cable to a drive, be sure to match the colored strip on the cable to pin 1 of the drive's interface connector. For the location of pin 1 on the drive's interface connector, see the documentation that came with the drive.

When disconnecting an interface cable from the system board, be sure to press in on the locking tabs on the cable connector (if any) before disconnecting the cable. When attaching an interface cable to the system board, be sure that the locking tabs snap into place, ensuring that the cable is firmly attached to the connector on the system board.

Most interface connectors are keyed for correct insertion; that is, a notch or a missing pin on one connector matches a tab or a filled-in hole on the other connector (see Figure 10-5). Keying ensures that the pin-1 wire in the cable (indicated by the colored strip along one edge of the cable) goes to the pin-1 end of the connector.

The pin-1 end of a connector on a board or a card is usually indicated by a silk-screened "1" printed directly on the board or card.

CAUTION: When connecting an interface cable, do not reverse the interface cable (do not place the colored strip away from pin 1 of the connector). Reversing the cable prevents the drive from operating and could damage the controller, the drive, or both.

Installing a Drive in a 5.25-Inch Drive Bay

The 5.25-inch drive bays can accommodate any of the following types of half-height drives:

- A CD-ROM or tape drive that uses the secondary EIDE interface or the secondary SCSI interface on the system board
- Any 5.25-inch device that uses its own controller card

NOTE: For information on configuring, connecting, and installing SCSI drives, see "Installing SCSI Devices" found later in this chapter.

To install a drive in a 5.25-inch drive bay, follow these steps:

1. **Unpack the drive and prepare it for installation.**

   CAUTION: Ground yourself by touching an unpainted metal surface on the back of the computer.

   Check the documentation that accompanied the drive to verify that the drive is configured for your computer system. Change any settings necessary for your configuration.

   If you are installing an EIDE CD-ROM or EIDE tape drive, configure the drive for the cable select setting.

   If you are installing a SCSI device, make sure the device has termination disabled. See "Installing SCSI Devices" found later in this chapter.

2. **Remove the computer cover as instructed in "Removing the Computer Cover" in Chapter 8.**

   CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

3. **Remove the front bezel according to the instructions in "Removing and Replacing the Front Bezel" found earlier in this chapter.**

4. **Remove the drive bracket from the bay you want to use.**

   Squeeze the metal tabs that extend from each side of the drive bracket toward each other, and pull the bracket out of the bay (see Figure 10-6).

   NOTE: For easier access inside the chassis, you may want to rotate the power supply out of the way temporarily. To do so, see "Rotating the Power Supply Away From the System Board" in Chapter 8.

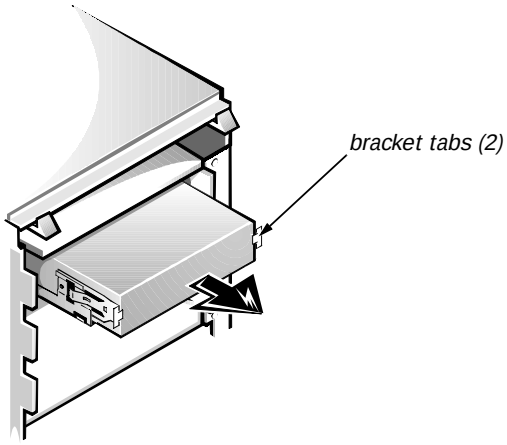


Figure 10-6. Removing a Drive

If a drive is already installed in the bay and you are replacing it, be sure to disconnect the DC power cable and interface cable from the back of the drive before sliding the bracket out of the bay. To remove the old drive from the bracket, turn the drive/bracket assembly upside down and unscrew the four screws that secure the drive to the bracket (see Figure 10-7).

5. Attach the bracket to the new drive.

Turn the drive upside down and locate the four screw holes around its perimeter. Fit the bracket over the drive, and then tilt the front of the drive up so that the bracket drops down into place. To ensure proper installation, all screw holes should be aligned and the tabs on the front of the bracket should be flush with the front of the drive (see Figure 10-7).

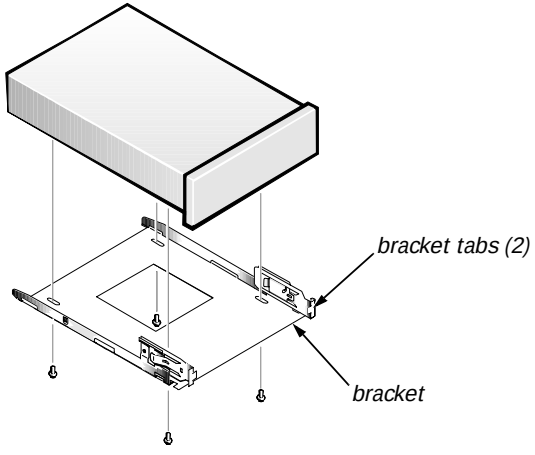


Figure 10-7. Attaching the Drive Bracket to the New Drive

To further ensure proper positioning of the drive in the chassis, insert and tighten all four screws *in the order in which the holes are numbered* (the holes are marked "1" through "4").

6. **Slide the new drive into the drive bay until it snaps securely into place (see Figure 10-8).**

   Make sure that both bracket tabs snap into place in the drive bay.

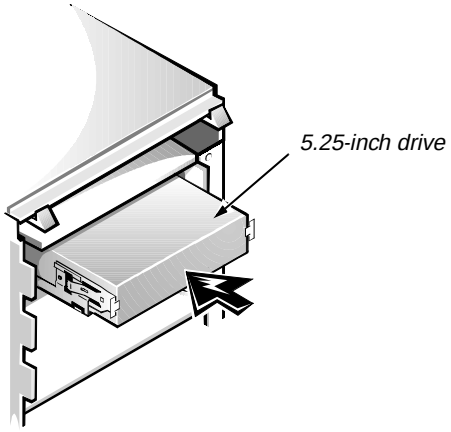


Figure 10-8. Inserting the New Drive Into the Drive Bay

7. **If you are installing a drive that has its own controller card, install the controller card in an expansion slot.**

   See "Installing an Expansion Card" in Chapter 9.

8. **Connect a DC power cable to the power input connector on the back of the drive (see Figure 10-9).**

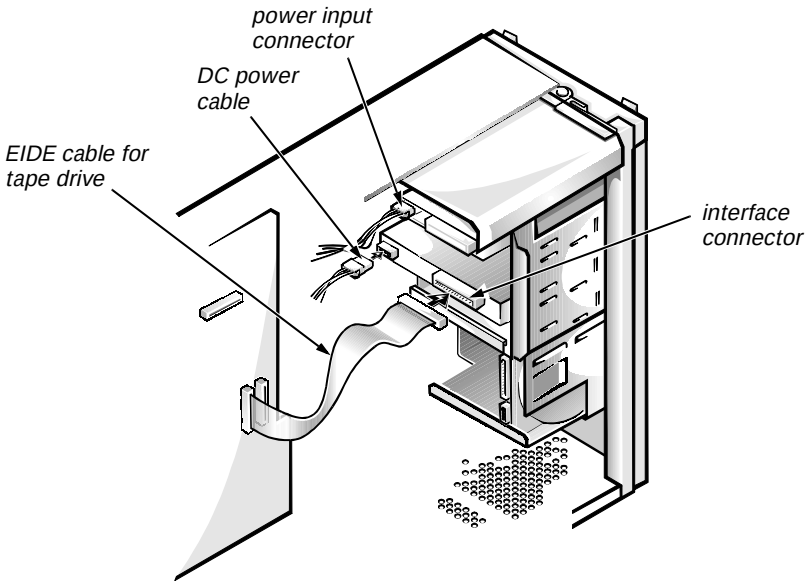


Figure 10-9. Attaching EIDE Tape Drive Cables

9. Connect the appropriate interface cable to the interface connector on the back of the drive (see Figure 10-9).

If your system came with an EIDE CD-ROM or tape drive, use the spare connector on the existing interface cable. Otherwise, use the EIDE or SCSI cable provided in the drive kit.

CAUTION: You must match the colored strip on the cable with pin 1 on the drive's interface connector to avoid possible damage to your system.

10. For an EIDE tape drive or CD-ROM drive, connect the other end of the interface cable to the interface connector labeled "IDE2" on the system board (see Figure 9-1).

For a SCSI drive, connect the cable from the drive to the interface connector labeled "SCSI_NARROW" on the system board.

For a diskette drive, connect the cable from the drive to the interface connector labeled "DISKETTE" on the system board.

For a drive that comes with its own controller card, connect the other end of the interface cable to the controller card.

Check all cable connections. Fold cables out of the way to provide airflow for the fan and cooling vents.

11. **If the 5.25-inch drive bay was previously empty, remove the front-panel insert from the front bezel.**

    See "Removing and Replacing Front-Panel Inserts" found earlier in this chapter.

12. **Replace the front bezel according to the instructions in "Removing and Replacing the Front Bezel" found earlier in this chapter.**

13. **Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.**

NOTE: After you remove and replace the chassis, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

14. **To reset the chassis intrusion detector, enter the System Setup program and reset Chassis Intrusion to Not Detected.**

    See Chapter 3, "Using the System Setup Program," for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

15. **Update your system configuration information.**

    For a diskette drive, update the appropriate Diskette Drive category (A or B) on Page 1 of the System Setup screens to reflect the size and capacity of your new diskette drive. (For more information, see Chapter 3, "Using the System Setup Program.")

    For EIDE CD-ROM and tape drives, set the appropriate Drive category (0 or 1) under Drives: Secondary to Auto.

16. **Verify that your system works correctly.**

    See your *Diagnostics and Troubleshooting Guide* for information on running the Dell Diagnostics and troubleshooting any problems that may occur. Use the following guidelines to determine which test to use:

    - If you installed a diskette drive, test it by running all of the subtests in the Diskette Drives Test Group of the Dell Diagnostics.
    - If you installed a CD-ROM drive, see the documentation that came with the drive for instructions on loading device drivers and using the drive. If it is an EIDE CD-ROM drive, test it by running all of the subtests in the IDE CD-ROM Drives Test Group of the Dell Diagnostics.
    - If you installed a tape drive, perform a tape backup and verification test with the drive as instructed in the tape-drive software documentation that came with the tape drive.

NOTE: The tape drives sold by Dell come with their own operating software and documentation. After you install a tape drive, refer to the documentation that came with the drive for instructions on installing and using the tape drive software.

Installing an EIDE Hard-Disk Drive

This section includes information on installing, partitioning, and formatting EIDE hard-disk drives. For instructions on installing, partitioning, and formatting SCSI hard-disk drives, see "Installing SCSI Devices" found later in this chapter.

Up to four 1-inch or up to two 1-inch and two 1.6-inch EIDE drives can be installed in the internal hard-disk drive cage below the externally accessible 5.25-inch drive bays.

EIDE Drive Addressing

All EIDE devices should be configured for the cable select jumper position, which assigns master and slave status to devices by their position on the EIDE cable. When two EIDE devices are connected to a single EIDE cable and are configured for the cable select jumper position, the device attached to the last connector on the interface cable is the master or boot device (drive 0) and the device attached to the middle connector on the interface cable is the slave device (drive 1). Refer to the drive documentation in your upgrade kit for information on setting devices to the cable select jumper position.

With the two EIDE interface connectors on the system board, your system can support up to four EIDE devices. EIDE hard-disk drives should be connected to the EIDE interface connector labeled "IDE1." (EIDE tape drives and CD-ROM drives should be connected to the EIDE interface connector labeled "IDE2.")

Installing an EIDE Hard-Disk Drive in the Internal Hard-Disk Drive Cage

Install an EIDE hard-disk drive in the hard-disk drive bracket as follows:

1. **If you are replacing a hard-disk drive that contains data you want to keep, be sure to make a backup of your files before you continue with this procedure.**

2. **Prepare the drive for installation.**

CAUTIONS: Ground yourself by touching an unpainted metal surface on the back of the computer.

When you unpack the drive, do not set it on a hard surface, which may damage the drive. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

Check the documentation that accompanied the drive to verify that it is configured for your computer system.

3. **Remove the computer cover as instructed in "Removing the Computer Cover" in Chapter 8.**

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

4. **Remove the front bezel according to the instructions in "Removing and Replacing the Front Bezel" found earlier in this chapter.**

5. **Open the drive cage door.**

   If any hard-disk drives are already installed in the bracket, disconnect the DC power cable and interface cable from each drive.

   Grasp the handle of the drive cage door on the front of the chassis, and pull out and down until the arms on the drive cage door (see Figure 10-10) disengage from the tabs on the bracket. This action pulls the bracket out of the drive cage about 1 to 3 inches.

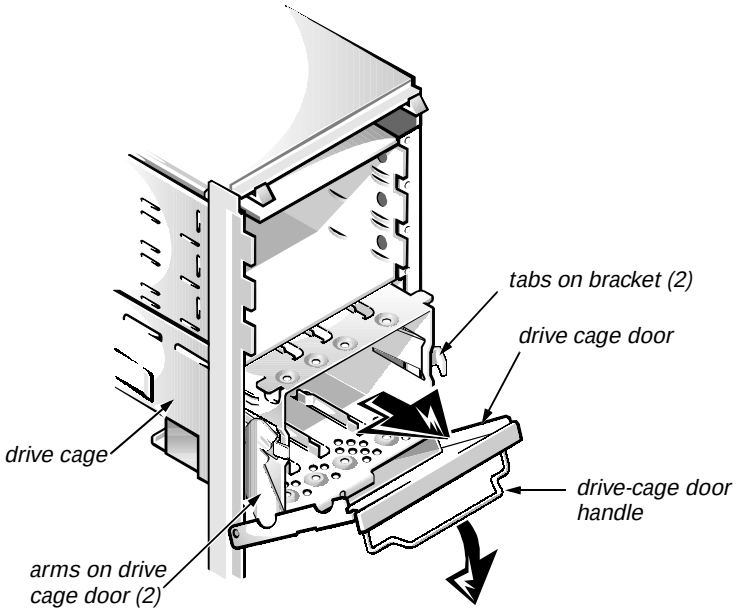


Figure 10-10. Removing the Hard-Disk Drive Bracket

6. **Remove the bracket from the drive cage.**

7. **Slide the drive into the chosen bay of the bracket, orienting it so that the connectors on the back of the drive face the inside of the chassis when the bracket is reinstalled (see Figure 10-11).**

8. **Align the four screw holes of the drive and bracket. Insert and tighten the screws that came with your upgrade kit.**

   Use the four screw holes in the top and bottom of the bracket (see Figure 10-11) to secure the installed hard-disk drive(s).

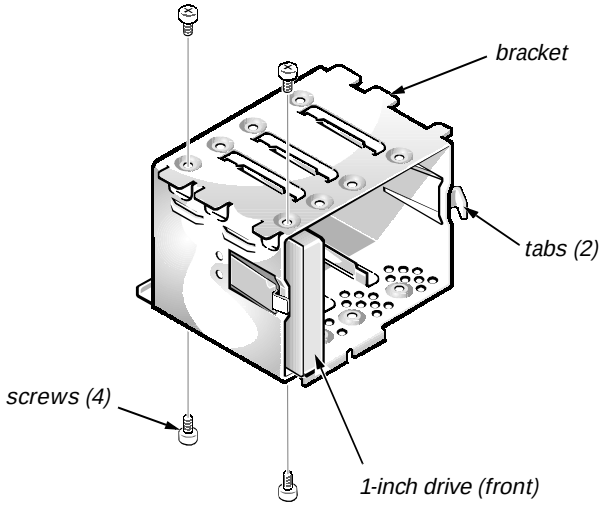


Figure 10-11. Inserting a 1-Inch Hard-Disk Drive Into the Bracket

9. Reinstall the hard-disk drive bracket into the chassis (see Figure 10-12).

Insert the bracket into the drive cage by sliding it in until the tabs snap into place. Rotate the drive cage door up and toward the chassis until it snaps securely into place. Be sure to fold down the drive-cage door handle (see Figure 10-10) so that the bezel can be replaced on the chassis.

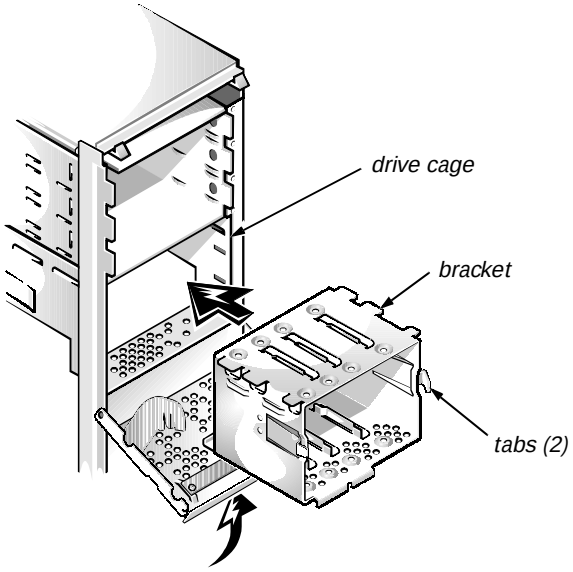


Figure 10-12. Inserting the Hard-Disk Drive Bracket Into the Chassis

10. **Connect a DC power cable to the power input connector on the back of the drive (see Figure 10-13).**

    Check all connectors to be certain that they are properly cabled and firmly seated.

11. **Connect one of the device connectors on the EIDE cable to the 40-pin interface connector on the back of the hard-disk drive (see Figure 10-13).**

CAUTION: You must match the colored strip on the EIDE cable with pin 1 on the drive's interface connector to avoid possible damage to your system.

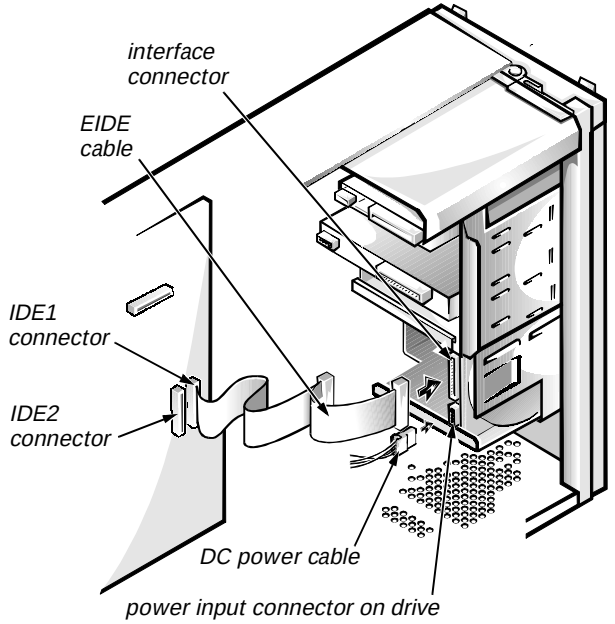


Figure 10-13. Attaching Hard-Disk Drive Cables

12. **If the other end of the EIDE cable is not already connected, connect it to the IDE1 connector on the system board.**

CAUTION: You must match the colored strip on the EIDE cable with pin 1 on the IDE1 connector to avoid possible damage to your system.

To locate the IDE1 connector, see Figure 9-1

13. **Replace the front bezel according to the instructions in "Removing and Replacing the Front Bezel" found earlier in this chapter.**

14. **Replace the computer cover. Then reconnect your computer and peripherals to their power sources, and turn them on.**

NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

15. **Insert a bootable diskette (such as the *Dell Diagnostics Diskette*) into drive A.**

16. **Enter the System Setup program, and update the appropriate Drive category (0 or 1) under Drives: Primary.**

See "Drives: Primary and Secondary" in Chapter 3.

17. **While in the System Setup program, reset the chassis intrusion detector by changing Chassis Intrusion to Not Detected.**

    See Chapter 3, "Using the System Setup Program," for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

After you update the System Setup settings, reboot the system.

18. **Partition and logically format your drive, as described in the next subsection, before proceeding to the next step.**

19. **Test the hard-disk drive by running the Hard-Disk Drives (Non-SCSI) Test Group in the Dell Diagnostics.**

    See your *Diagnostics and Troubleshooting Guide* for information on running the diagnostics and troubleshooting any problems that may occur.

20. **Install your operating system on the hard-disk drive.**

    Refer to the documentation that came with your operating system.

Partitioning and Logically Formatting Your EIDE Hard-Disk Drive

EIDE hard-disk drives must be physically formatted, partitioned, and logically formatted before they can be used to store data. Every hard-disk drive from Dell is physically formatted before it is sent to you.

NOTE: When using the Windows NT operating system with the FAT 16 file system, the primary partition for each hard-disk drive can be no larger than 2 gigabytes (GB). Extended partitions can be larger than 2 GB, but each logical drive within an extended partition must be no larger than 2 GB.

To partition and logically format your hard-disk drive, use the program(s) offered by your operating system.

Installing SCSI Devices

This section describes how to configure and install SCSI devices in your Dell Precision system.

SCSI Configuration Guidelines

Although SCSI devices are installed essentially the same way as other devices, their configuration requirements are different. For details on configuring your particular SCSI subsystem, refer to the documentation that came with your SCSI devices. The following subsections offer some general guidelines.

SCSI ID Numbers

Internal SCSI devices attached to the integrated Adaptec 7890 Ultra2/Wide low voltage differential (LVD) controller through the 68-pin primary SCSI connector on the system board must have a unique SCSI ID number from 0 to 15.

Externally accessible SCSI devices attached to the integrated Adaptec 7880 Ultra/Wide controller through the 50-pin Narrow SCSI connector on the system board must have a unique SCSI ID number from 0 to 7.

External SCSI devices connected to the integrated Adaptec 7880 Ultra/Wide controller through the 68-pin Ultra/Wide SCSI connector on the system back panel must have a unique SCSI ID number from 0 to15. This SCSI ID number cannot conflict with any SCSI ID number already assigned to a SCSI device connected to the 50-pin internal SCSI connector on the system board.

When SCSI devices are shipped from Dell, the default SCSI ID numbers for the primary and secondary controllers are assigned as follows:

- Primary SCSI controller:
  - — The primary 7890 Ultra2/Wide LVD SCSI controller is configured through the computer's basic input/output system (BIOS) as SCSI ID 7.
  - — The first internal SCSI hard-disk drive is configured as SCSI ID 0. (The drive used to boot your system should always be configured as SCSI ID 0.)
- Secondary SCSI controller:
  - — The secondary 7880 Ultra/Wide SCSI controller is configured through the computer's BIOS as SCSI ID 7.
  - — A SCSI CD-ROM drive is configured as SCSI ID 5.
  - — A SCSI tape drive or digital audio tape (DAT) drive (if installed) is configured as SCSI ID 6.

*NOTE: There is **no** requirement that SCSI ID numbers be assigned sequentially or that devices be attached to the cable in order by ID number.*

SCSI devices installed by Dell are configured correctly during the manufacturing process. You do not need to set the SCSI ID for these SCSI devices.

If you attach additional optional SCSI devices, refer to the documentation that came with each device for information about setting the appropriate SCSI ID number.

CAUTION: Dell recommends that you use only SCSI cables purchased from Dell. SCSI cables purchased elsewhere are not guaranteed to work with Dell Precision 610 systems.

Device Termination

SCSI logic requires that termination be enabled for the two devices at opposite ends of the SCSI chain and disabled for all devices in between. However, because both SCSI controllers are self-terminating and because all internal SCSI cables provided by

Dell have active termination at the end of the cables, any SCSI devices you install should have termination disabled on the devices.

Furthermore, when attaching external SCSI devices, you should use only external SCSI cables with active termination on the cable at one end. When used with this type of cable, all external SCSI devices also need to have termination disabled on the devices and be connected toward termination.

See the documentation provided with any optional SCSI device you purchase for information on disabling termination on the device.

SCSI Cables

The 68-pin (internal) SCSI cable in your Precision 610 system connects SCSI devices (normally SCSI hard-disk drives) to the 7890 Ultra2/Wide LVD controller.

- The connector at the end of the cable attaches to the Ultra2/Wide LVD primary SCSI controller connector labeled "SCSI_ULTRA2" on the system board.
- The other connectors on the cable are used for attaching up to four SCSI hard-disk drives in the internal drive bays (see Figure 10-14).

The 50-pin (internal) Narrow SCSI cable connects SCSI devices to the 7880 Ultra/Wide controller.

- The narrow connector at the end of the cable attaches to the secondary SCSI controller connector labeled "SCSI_NARROW" on the system board.
- The other connectors on the cable are used for attaching SCSI devices installed in the externally accessible drive bays (see Figure 10-14).

An optional shielded external cable with a 68-pin connector is used for attaching an external SCSI device to the 7880 external SCSI connector on the system back panel.

Refer to the documentation that came with the external SCSI device for information on how to connect the device, set its SCSI ID, and disable termination.

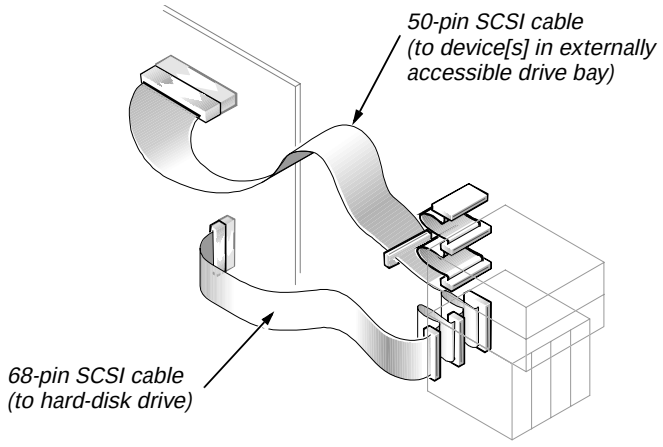


Figure 10-14. Internal SCSI Cable

General Procedure for Installing SCSI Devices

Configure and install one or more SCSI devices in your computer as follows:

1. **Determine which connector on the internal SCSI cable you will attach to each SCSI device.**

   See "SCSI Configuration Guidelines" found earlier in this section.

2. **Unpack each SCSI device and prepare it for installation.**

   CAUTIONS: Ground yourself by touching an unpainted metal surface on the back of the computer.

   When you unpack the drive, do not set it on a hard surface, which may damage the drive. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

   Configure the device for a SCSI ID number and disable termination, if necessary. For instructions, see the documentation that came with the SCSI device as well as "SCSI Configuration Guidelines" found earlier in this section.

3. **Install the SCSI devices as appropriate.**

   - *To install a SCSI hard-disk drive*, complete steps 3 through 9 of "Installing an EIDE Hard-Disk Drive in the Internal Hard-Disk Drive Cage" found earlier in this chapter. Then continue with step 4 of this procedure.
   - *To install a SCSI tape drive, CD-ROM drive, or DAT drive*, complete steps 2 through 6 of "Installing a Drive in a 5.25-Inch Drive Bay" found earlier in this chapter. Then continue with step 4 of this procedure.
   - *To install an external SCSI device*, continue with step 4 of this procedure.

- *If you are installing a SCSI host adapter card*, configure the card and install it in an empty expansion slot (see "Installing an Expansion Card" in Chapter 9.) If you attach any SCSI hard-disk drives to the host adapter card, connect the hard-disk drive access cable to the SCSI host adapter card and to the AUX LED connector on the system board (see Figure 9-1).

4. **Attach the SCSI cable to each SCSI device.**

   For additional instructions on connecting SCSI devices, see "SCSI Cables" found earlier in this section.

   If you are installing an internal SCSI device, firmly press the SCSI cable's header connector onto the 50- or 68-pin connector on the back of the device.

CAUTION: You must match the colored strip on the cable with pin 1 on the drive's interface connector to avoid possible damage to your system.

   The connectors on Narrow SCSI cables are keyed for proper positioning—a raised area on the outside of the header connector fits into a notch on the device connector. The connectors on Wide SCSI cables are shaped so that they can be attached one way only.

   If you are installing an external SCSI device, connect one end of the external SCSI cable to the SCSI bus connector on the back of the device. Attach the other end of the external SCSI cable to the SCSI connector on the system back panel.

NOTE: Dell offers an external SCSI 68-pin-to-50-pin adapter kit for connecting SCSI-3 devices to the SCSI-2 connector on the Precision 610 system back panel. Contact your Dell sales representative for more information.

5. **Connect the SCSI device(s) to power.**

   - *If you are installing an internal SCSI device*, connect a DC power cable to the power input connector on the SCSI device.
   - *If you are installing an external SCSI device*, connect the socket end of the power cable into the AC power receptacle on the back of the SCSI device. Connect the other end of the power cable into a standard electrical wall outlet.

   Check all other cable connections. Fold all internal cables out of the way to provide airflow for the fan or cooling vents.

6. **If you installed an externally accessible device, remove the front bezel and remove the front-panel insert for the drive bay from the front bezel. Then replace the front bezel.**

   For instructions, see "Removing and Replacing the Front Bezel" and "Removing and Replacing Front-Panel Inserts" found earlier in this chapter.

7. **Replace the computer cover. Then reconnect your computer and peripherals to their power sources, and turn them on.**

NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:

```
ALERT! Cover was previously removed.
```

8. **To reset the chassis intrusion detector, enter the System Setup program and reset Chassis Intrusion to Not Detected.**

   See Chapter 3, "Using the System Setup Program," for instructions.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

9. **If necessary, update the drive system configuration information in the System Setup program.**

   For any SCSI devices, the respective category under Drives: Primary or Drives: Secondary should be set to None. For instructions, see Chapter 3, "Using the System Setup Program."

10. **If you installed a SCSI hard-disk drive, partition and format the drive. Then install the operating system.**

    For instructions, see the next subsection, "Partitioning and Formatting SCSI Hard-Disk Drives," and your operating system documentation.

11. **Test the SCSI devices.**

    Test a SCSI hard-disk drive by running the SCSI diagnostics. See your *Diagnostics and Troubleshooting Guide* for information on running the Dell Diagnostics and troubleshooting any problems that may occur.

    To test a SCSI tape drive, refer to the documentation for the tape drive software to perform a tape drive backup and verification test.

Partitioning and Formatting SCSI Hard-Disk Drives

You may need to use different programs than those provided with the operating system to partition and format SCSI hard-disk drives. Refer to the documentation that came with your SCSI software drivers for information on installing the appropriate drivers and preparing your SCSI hard-disk drive for use.

NOTE: When using the Windows NT operating system with the FAT 16 file system, the primary partition for each hard-disk drive can be no larger than 2 GB. Extended partitions can be larger than 2 GB, but each logical drive within an extended partition must be no larger than 2 GB.

APPENDIX A
Technical Specifications

Table A-1. Technical Specifications

Processor	
Processor type	Intel Pentium II Xeon processor that runs at 400 MHz internally/100 MHz externally. A slower compatibility speed can be set through the System Setup program.
Internal cache	32-KB (16-KB data cache; 16-KB instruction cache)
L2 cache	512-KB or 1-MB pipelined burst, four-way set-associative, write-back ECC SRAM on each Slot 2 SEC cartridge
Math coprocessor	internal to the processor
System Information	
System chip set	Intel Slot 2/440GX PCIset
Data bus width	64 bits
Address bus width	32 bits
DMA channels	seven
Interrupt levels	15
System BIOS chip	2 Mb
Audio controller	16-bit Plug and Play Crystal 4237B
Primary SCSI controller	Adaptec 7890 Ultra2/Wide LVD (Adaptec 2940 U2W-equivalent)
Secondary SCSI controller	Adaptec 7880 Ultra/Wide (Adaptec 2940 UW-equivalent)

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table A-1. Technical Specifications *(continued)*

System Information *(continued)*	
NIC	3Com 3C905b-TX Wakeup On LAN-capable
I/O controller	National PC 87309
Expansion Bus	
Bus types	PCI, ISA, and AGP
Bus speed	PCI: 33.3 MHz ISA: 8.33 MHz AGP: 66.6 MHz (2X-capable)
PCI expansion-card connectors	five (one of the PCI connectors shares a card-slot opening with the ISA connector) (Add-in RAID co-processor card 60-pin connector can be connected only to PCI slot 4)
ISA expansion-card connectors	one (the ISA connector shares a card-slot opening with one of the PCI connectors)
AGP expansion-card connectors	one
PCI expansion-card connector size	120 pins
PCI expansion-card connector data width (maximum)	32 bits
ISA expansion-card connector size	98 pins
ISA expansion-card connector data width (maximum)	16 bits
AGP expansion-card connector size	124 pins
AGP expansion-card connector data width (maximum)	32 bits
RAID extension connector size	60 pins
System Clocks	
System clock	100 MHz
SDRAM memory clock	100 MHz
I/O APIC clock	14 MHz
Diskette/communications ports	48 MHz
USB clock	48 MHz

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table A-1. Technical Specifications *(continued)*

Memory	
Architecture	72-bit ECC SDRAM
DIMM sockets	four
DIMM capacities	64- and 128-MB unbuffered, 72-bit SDRAM; 256-MB and 512-MB registered, 72-bit SDRAM
Standard RAM	64 MB
Maximum RAM	2048 MB (with 512 MB registered DIMMs only)
BIOS address	F000:0000h–F000:FFFFh
Drives	
Externally accessible bays	one 3.5-inch bay dedicated to a 3.5-inch diskette drive; three 5.25-inch bays for tape drives, CD-ROM drives, or other 5.25-inch peripherals
Internally accessible bays	two 1.6-inch drive bays and two 1-inch drive bays for EIDE or SCSI hard-disk drives installed vertically
Ports and Connectors	
Externally accessible:	
Serial (DTE)	two 9-pin connectors; 16550-compatible
Parallel	one 25-pin connector (bidirectional)
SCSI	one 68-pin Ultra/Wide SCSI connector
Video	standard 15-pin DIN connector(s) on add-in graphics adapter
PS/2-style keyboard	6-pin mini-DIN connector
PS/2-compatible mouse	6-pin mini-DIN connector
NIC	RJ45 connector
USB	two USB-compliant 4-pin connectors
Audio line in	1/8-inch miniature audio jack
Audio line out	1/8-inch miniature audio jack
Audio microphone in	1/8-inch miniature audio jack

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table A-1. Technical Specifications *(continued)*

Ports and Connectors *(continued)*	
Internally accessible:	
EIDE drive	two 40-pin connectors on PCI local bus
Primary SCSI channel	one 68-pin Ultra2/Wide SCSI connector
Secondary SCSI channel	one internal 50-pin Narrow SCSI connector; one external 68-pin Ultra/Wide SCSI connector
Diskette drive	one 26-pin connector
CD-ROM drive audio interface	4-pin connector
Wakeup On LAN	3-pin connector
Fan	3-pin connector
Control panel connectors:	
Thermal sensor	3-pin connector
Chassis intrusion	2-pin connector
Speaker	4-pin connector
Video	
Video type	AGP and PCI graphics adapters
Key Combinations	
<Ctrl><Alt><Del>	restarts (reboots) the system
<F2> or <Ctrl><Alt><Enter>	starts System Setup program (during POST only while Dell logo screen is displayed)
Controls and Indicators	
Reset control	push button
Power control	push button
Power indicator/sleep mode indicator	green LED (indicates power) amber LED (indicates sleep mode)
Hard-disk drive access indicator	green LED

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table A-1. Technical Specifications *(continued)*

Controls and Indicators *(continued)*	
Link integrity indicator (on NIC connector)	green LED
Network activity indicator (on NIC connector)	yellow LED
Power indicator (on system board)	green LED
Standby power indicator (on system board)	green LED
Power	
DC power supply:	
Wattage	330 W
Heat dissipation	850 BTU/hr (nominal)
Voltage	90 to 135 V at 60 Hz; 180 to 265 V at 50 Hz Autoranging 90 to 265 V
Backup battery	3-V CR2032 coin cell
Physical	
Height	45.9 cm (18.1 inches)
Width	21.6 cm (8.5 inches)
Depth	43.6 cm (17.6 inches)
Weight	16.0 kg (37.0 lb) or more, depending on options installed
Environmental	
Temperature:	
Operating	10° to 35°C * (50° to 95°F)
Storage	–40° to 65°C (–40° to 149°F)
Relative humidity	20% to 80% (noncondensing)
Maximum vibration:	
Operating	0.25 G at 3 to 200 Hz for 30 min
Storage	0.5 G at 3 to 200 Hz for 30 min

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table A-1. Technical Specifications *(continued)*

Environmental *(continued)*	
Maximum shock:	
Operating	half-sine wave form: 50 G for 2 ms
Storage	half-sine wave form: 110 G for 2 ms square wave form: 27 G for 15 ms
Altitude:	
Operating	–16 to 3048 m * (–50 to 10,000 ft)
Storage	–16 to 10,600 m (–50 to 35,000 ft)

* *At 35°C (95°F), the maximum operating altitude is 914 m (3000 ft).*

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

APPENDIX B
Hardware Configuration Features

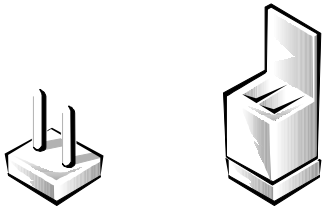
This appendix provides specific information about the jumpers on your system board and the input/output (I/O) ports and connectors on the back panel of your computer. It also provides some basic information on jumpers and switches, a listing of interrupt request (IRQ) assignments, and memory maps.

Jumpers and Switches—A General Explanation

Jumpers and switches provide a convenient and reversible way of reconfiguring the circuitry on a printed circuit board. When reconfiguring your system, you may need to change jumper settings on your system board; you may also need to change jumper and/or switch settings on expansion cards or drives.

Jumpers

Jumpers are small blocks on a circuit board with two or more pins emerging from them. Plastic plugs containing a wire fit down over the pins. The wire connects the pins and creates a circuit.



To change a jumper setting, pull the plug off its pin(s) and carefully fit it down onto the pin(s) indicated.

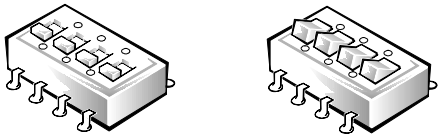
CAUTION: Make sure your system is turned off before you change a jumper setting. Otherwise, damage to your system or unpredictable results may occur.

A jumper is referred to as *open* or *unjumpered* when the plug is pushed down over only one pin or if there is no plug at all. When the plug is pushed down over two pins, the jumper is referred to as *jumpered*. The jumper setting is often shown in text as two numbers, such as *1-2*. The number *1* is printed on the circuit board so that you can identify each pin number based on the location of pin 1.

Figure B-1 shows the location and default settings of the jumper blocks on your system board. See Table B-1 for the designations, default settings, and functions of your system's jumpers.

Switches

Switches control various circuits or functions in your computer system. The switches you are most likely to encounter are dual in-line package (DIP) switches, which are normally packaged in groups of two or more switches in a plastic case. Two common types of DIP switches are *slide* switches and *rocker* switches (see the following illustration).



slide switches *rocker switches*

Each of these switches has two positions, or *settings* (usually *on* and *off*). To change the setting of a slide switch, use a small, pointed object such as a small screwdriver or a straightened paper clip to slide the switch to the proper position. To change the setting of a rocker switch, use the screwdriver or paper clip to press down on the appropriate side of the switch. In either case, do not use a pen, pencil, or other object that might leave a residue on the switch.

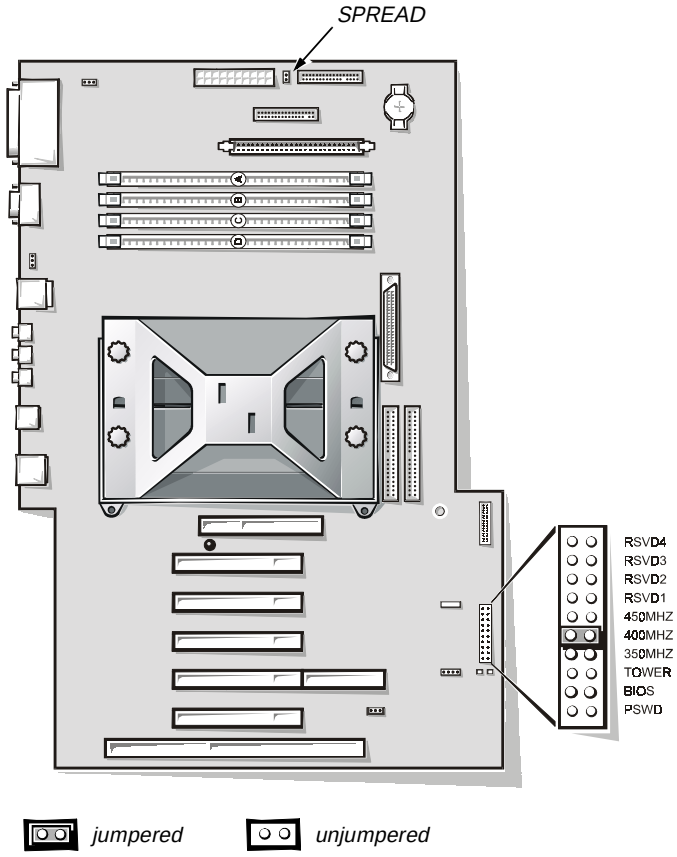


Figure B-1. System Board Jumpers

Table B-1. System-Board Jumper Settings

Jumper	Setting		Description
SPREAD			Reserved (*do not remove jumper*).
RSVD4			Reserved (*do not install jumper plug*).
RSVD3			Reserved (*do not install jumper plug*).
RSVD2			Reserved (*do not install jumper plug*).
RSVD1			Reserved (*do not install jumper plug*).
450MHZ*			Reserved *(do not install jumper plug)*.
400MHZ*			Jumpered when the processor's internal speed is 400 MHz.
350MHZ*			Reserved *(do not install jumper plug)*.
TOWER			System board is installed in a mini tower chassis *(do not install jumper plug)*.
BIOS			Reserved *(do not install jumper plug)*.
PSWD		(default)	Password features enabled.
			Password features disabled.

* *One set of the speed jumper pins must have a jumper plug installed; otherwise, the system will operate at an undetermined speed.*

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

jumpered *unjumpered*

System Board Labels

Table B-2 lists the labels for connectors and sockets on your system board and gives a brief description of their functions.

Table B-2. System Board Connectors and Sockets

Connector or Socket	Description
AGP	AGP graphics adapter connector
AUX LED	Hard-disk drive access indicator connector
BATTERY	Battery socket
CD-IN	CD-ROM drive audio interface connector
DIMM_*x*	DIMM socket
DISKETTE, DISK2	Diskette drive interface connector
ENET	NIC connector
FAN	Processor fan connector
IDE*n*	EIDE interface connector
ISA1*	ISA expansion-card connector
KYBD/MOUSE	Keyboard connector and mouse connector (stacked)
LAN	Wakeup On LAN card connector
LINE-IN	Line-in jack
LINE-OUT	Line-out jack
MIC-IN	Microphone jack
MODEM-IN	Modem connector
PANEL	Control panel connector
PARALLEL/SCSI	Parallel port connector (sometimes referred to as *LPT1*) and SCSI connector (stacked)
PCI*n**	PCI expansion-card connectors
POWER1	Main power input connector
RAID	Optional RAID PCI expansion card connector extension

* *The connector pair ISA1/PCI5 share a single card-slot opening so that only one connector of the pair can be used.*

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table B-2. System Board Connectors and Sockets *(continued)*

Connector or Socket	Description
SCSI_NARROW	Secondary SCSI connector
SCSI_ULTRA2	Primary SCSI connector
SERIAL1/2	Serial port connectors (sometimes referred to as *COM1* and *COM2;* stacked)
SLOT2_PRI	Primary Intel Pentium II Xeon processor Slot 2 SEC cartridge connector
SLOT2_SEC	Secondary Intel Pentium II Xeon processor Slot 2 SEC cartridge connector
USB	USB connectors

* *The connector pair ISA1/PCI5 share a single card-slot opening so that only one connector of the pair can be used.*

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

I/O Ports and Connectors

The I/O ports and connectors on the back panel of your computer are the gateways through which your computer system communicates with external devices, such as a keyboard, mouse, printer, and monitor. Figure B-2 identifies the I/O ports and connectors for your computer.

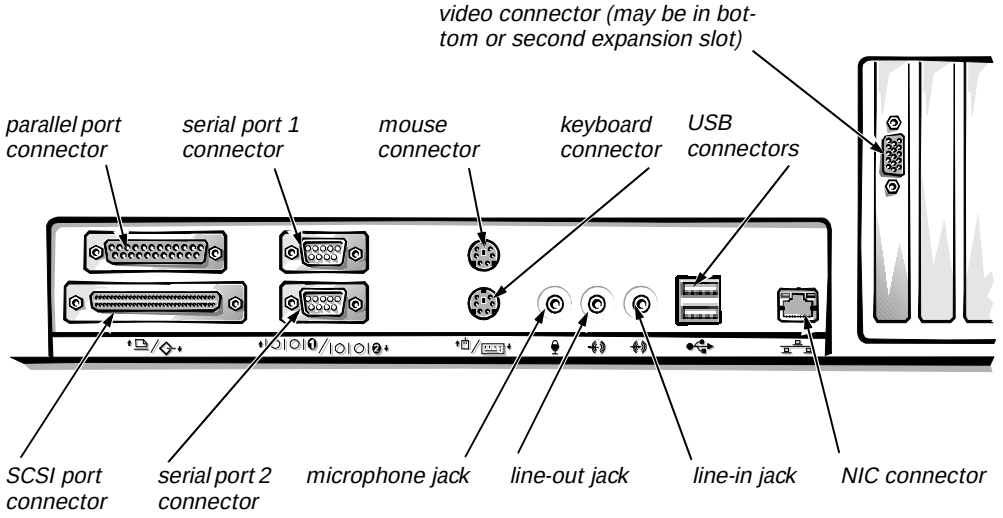


Figure B-2. I/O Ports and Connectors

Serial and Parallel Ports

The two built-in serial ports use 9-pin D-subminiature connectors on the back panel. These ports support devices such as external modems, printers, plotters, and mice that require serial data transmission (the transmission of data one bit at a time over one line).

Most software uses the term COM (for COMmunications) plus a number to designate a serial port (for example, COM1 or COM2). The default designations of your computer's built-in serial ports are COM1 and COM2.

The built-in parallel port uses a 25-pin D-subminiature connector on the computer's back panel. This I/O port sends data in parallel format (where eight data bits, or one byte, are sent simultaneously over eight separate lines in a single cable). The parallel port is used primarily for printers.

Most software uses the term LPT (for Line PrinTer) plus a number to designate a parallel port (for example, LPT1). The default designation of your computer's built-in parallel port is LPT1.

Port designations are used, for example, in software installation procedures that include a step in which you identify the port to which your printer is attached, thus telling your software where to send its output. (An incorrect designation prevents the printer from printing or causes scrambled print.)

Adding an Expansion Card Containing Serial or Parallel Ports

Your computer system has an autoconfiguration capability for the serial ports. This feature lets you add an expansion card containing a serial port that has the same designation as one of the built-in ports without having to reconfigure the card. When the computer detects the duplicate serial port on the expansion card, it *remaps* (reassigns) the built-in port to the next available port designation.

Both the new and the remapped COM ports share the same IRQ setting, as follows:

COM1, COM3: IRQ4 (shared setting)
COM2, COM4: IRQ3 (shared setting)

These COM ports have the following I/O address settings:

COM1: 3F8h
COM2: 2F8h
COM3: 3E8h
COM4: 2E8h

For example, if you add an internal modem card with a port configured as COM1, the computer then sees logical COM1 as the address on the modem card. It automatically remaps the built-in serial port that was designated as COM1 to COM3, which shares the COM1 IRQ setting. (Note that when you have two COM ports sharing an IRQ setting, you can use either port as necessary *but you may not be able to use them both at the same time*.) If you install one or more expansion cards with serial ports designated as COM1 and COM3, the corresponding built-in serial port is disabled, as described in "Serial Port 1 and Serial Port 2" in Chapter 3.

Before adding a card that remaps the COM ports, check the documentation that accompanied your software to make sure that the software can be mapped to the new COM port designation.

To avoid autoconfiguration, you may be able to reset the expansion card's jumpers or switches so that *its* port designation changes to the next available COM number, leaving the designation for the built-in port as is. Alternatively, you can disable the built-in ports through the System Setup program. The documentation for your expansion card should provide the card's default I/O address and allowable IRQ settings. It should also provide instructions for readdressing the port and changing the IRQ setting if necessary.

The built-in parallel port has autoconfiguration capability through the System Setup program. That is, if you set the parallel port to its automatic configuration and add an expansion card containing a port configured as LPT1 (IRQ7, I/O address 378h), the system automatically remaps the built-in parallel port to its secondary address (IRQ5, I/O address 278h). If the secondary port address is already being used, the built-in parallel port is turned off. For more information, see "Parallel Port" in Chapter 3.

For general information on how your operating system handles serial and parallel ports as well as for more detailed command procedures, see your operating system documentation.

Serial Port Connectors

If you reconfigure your hardware, you may need pin number and signal information for the serial port connectors. Figure B-3 illustrates the pin numbers for the serial port connectors, and Table B-3 lists and defines the pin assignments and interface signals for the serial port connectors.

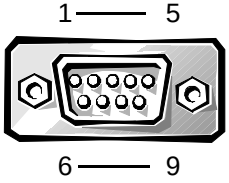


Figure B-3. Pin Numbers for the Serial Port Connectors

Table B-3. Pin Assignments for the Serial Port Connectors

Pin	Signal	I/O	Definition
1	DCD	I	Data carrier detect
2	SIN	I	Serial input
3	SOUT	O	Serial output
4	DTR	O	Data terminal ready
5	GND	N/A	Signal ground
6	DSR	I	Data set ready
7	RTS	O	Request to send
8	CTS	I	Clear to send
9	RI	I	Ring indicator
Shell	N/A	N/A	Chassis ground

Parallel Port Connector

If you reconfigure your hardware, you may need pin number and signal information for the parallel port connector. Figure B-4 illustrates the pin numbers for the parallel port connector, and Table B-4 lists and defines the pin assignments and interface signals for the parallel port connector.

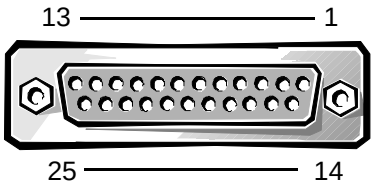


Figure B-4. Pin Numbers for the Parallel Port Connector

Table B-4. Pin Assignments for the Parallel Port Connector

Pin	Signal	I/O	Definition
1	STB#	I/O	Strobe
2	PD0	I/O	Printer data bit 0
3	PD1	I/O	Printer data bit 1
4	PD2	I/O	Printer data bit 2
5	PD3	I/O	Printer data bit 3
6	PD4	I/O	Printer data bit 4
7	PD5	I/O	Printer data bit 5
8	PD6	I/O	Printer data bit 6
9	PD7	I/O	Printer data bit 7
10	ACK#	I	Acknowledge
11	BUSY	I	Busy
12	PE	I	Paper end
13	SLCT	I	Select
14	AFD#	O	Automatic feed
15	ERR#	I	Error
16	INIT#	O	Initialize printer
17	SLIN#	O	Select in
18–25	GND	N/A	Signal ground

External SCSI Connector

The 68-pin external small computer system interface (SCSI) connector on the system back panel supports external Ultra SCSI devices such as scanners, ZIP drives, and optical drives.

If you reconfigure your hardware, you may need pin number and signal information for the external SCSI connector. Figure B-5 illustrates the pin numbers for the external SCSI connector, and Table B-5 lists and defines the pin assignments and interface signals for the external SCSI connector.

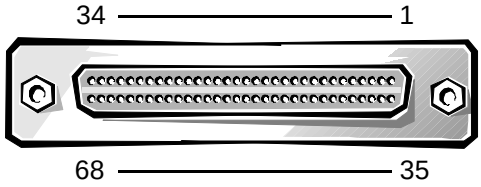


Figure B-5. Pin Numbers for the External SCSI Connector

Table B-5. Pin Assignments for the External SCSI Connector

Pin	Signal	I/O	Definition
1–16	GND	N/A	Signal ground
17–18	TRMPWR	N/A	Terminator power
19	RSVD	N/A	Reserved
20–34	GND	N/A	Signal ground
35	D12	I/O	SCSI data bit 12
36	D13	I/O	SCSI data bit 13
37	D14	I/O	SCSI data bit 14
38	D15	I/O	SCSI data bit 15
39	DPARH	I/O	SCSI data parity high
40	D0	I/O	SCSI data bit 0
41	D1	I/O	SCSI data bit 1
42	D2	I/O	SCSI data bit 2
43	D3	I/O	SCSI data bit 3
44	D4	I/O	SCSI data bit 4
45	D5	I/O	SCSI data bit 5
46	D6	I/O	SCSI data bit 6
47	D7	I/O	SCSI data bit 7
48	DPARL	I/O	SCSI data parity low
49–50	GND	N/A	Signal ground
51–52	TRMPWR	N/A	Terminator power
53	RSVD	N/A	Reserved
54	GND	N/A	Signal ground

Table B-5. Pin Assignments for the External SCSI Connector *(continued)*

Pin	Signal	I/O	Definition
55	ATN	I/O	SCSI attention
56	GND	N/A	Signal ground
57	BSY	I/O	SCSI busy
58	ACK	I/O	SCSI acknowledge
59	RST	I/O	SCSI reset
60	MSG	I/O	SCSI message
61	SEL	I/O	SCSI select
62	C/D	I/O	SCSI command/data
63	REQ	I/O	SCSI request
64	I/O	I/O	SCSI in/out
65	D8	I/O	SCSI data bit 8
66	D9	I/O	SCSI data bit 9
67	D10	I/O	SCSI data bit 10
68	D11	I/O	SCSI data bit 11

Keyboard and Mouse Connectors

Your system uses a Personal System/2 (PS/2)-style keyboard and supports a PS/2-compatible mouse. Cables from both devices attach to 6-pin miniature *Deutsche Industrie Norm* (DIN) connectors on the back panel of your computer.

A PS/2-compatible mouse works identically to an industry-standard serial mouse or bus mouse except that it has its own dedicated connector, which frees up both serial ports and does not require an expansion card. Circuitry inside the mouse detects the movement of a small ball and relays the direction to the computer.

Mouse driver software can give the mouse priority with the processor by issuing IRQ12 whenever a new mouse movement is made. The driver software also passes along the mouse data to the application program that is in control.

Keyboard Connector

If you reconfigure your hardware, you may need pin number and signal information for the keyboard connector. Figure B-6 illustrates the pin numbers for the keyboard connector, and Table B-6 lists and defines the pin assignments and interface signals for the keyboard connector.

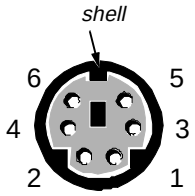


Figure B-6. Pin Numbers for the Keyboard Connector

Table B-6. Pin Assignments for the Keyboard Connector

Pin	Signal	I/O	Definition
1	KBDATA	I/O	Keyboard data
2	NC	N/A	No connection
3	GND	N/A	Signal ground
4	FVcc	N/A	Fused supply voltage
5	KBCLK	I/O	Keyboard clock
6	NC	N/A	No connection
Shell	N/A	N/A	Chassis ground

Mouse Connector

If you reconfigure your hardware, you may need pin number and signal information for the mouse connector. Figure B-7 illustrates the pin numbers for the mouse connector, and Table B-7 lists and defines the pin assignments and interface signals for the mouse connector.

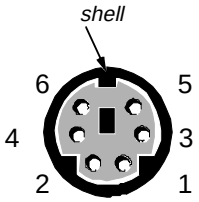


Figure B-7. Pin Numbers for the Mouse Connector

Table B-7. Pin Assignments for the Mouse Connector

Pin	Signal	I/O	Definition
1	MFDATA	I/O	Mouse data
2	NC	N/A	No connection
3	GND	N/A	Signal ground
4	FVcc	N/A	Fused supply voltage
5	MFCLK	I/O	Mouse clock
6	NC	N/A	No connection

Video Connector

For information on your video connector, see the manufacturer's specifications that accompanied your graphics adapter.

NIC Connector

Your system contains an RJ45 connector (see Figure B-8) on the back panel for attaching an unshielded twisted pair (UTP) Ethernet cable, which is used in 10BASE-T and 100BASE-TX networks. The network interface controller (NIC) provides all the functions normally handled by a separate network expansion card. To connect your system to and configure it for use on an Ethernet network, see Chapter 5, "Using the Network Interface Controller."

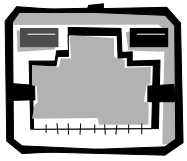


Figure B-8. NIC Connector

USB Connectors

Your system contains two Universal Serial Bus (USB) connectors for attaching USB-compliant devices. USB devices are typically peripherals such as keyboards, mice, printers, and computer speakers.

CAUTION: Do not attach a USB device or a combination of USB devices that draw a maximum current over 500 milliamperes (mA) per channel at +5 volts (V). Attaching devices that exceed this threshold may cause the USB ports to shut down. See the documentation that accompanied the USB devices for their maximum current ratings.

If you reconfigure your hardware, you may need pin number and signal information for the USB connectors. Figure B-9 illustrates the pin numbers for the USB connectors, and Table B-8 lists and defines the pin assignments and interface signals for the USB connectors.

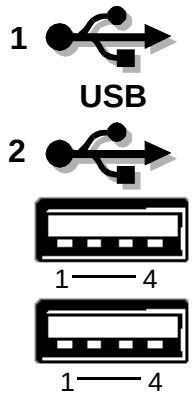


Figure B-9. Pin Numbers for the USB Connectors

Table B-8. Pin Assignments for the USB Connectors

Pin	Signal	I/O	Definition
1	Vcc	N/A	Supply voltage
2	DATA	I	Data in
3	+DATA	O	Data out
4	GND	N/A	Signal ground

Microphone Jack

The microphone jack (see Figure B-10) can be used to attach a standard personal computer microphone. Connect the audio cable from the microphone to the microphone jack. The microphone input is a mono source with maximum signal levels of 89 millivolts root mean squared (mVrms).

Figure B-10. Microphone Jack

Line-Out Jack

The line-out jack (see Figure B-11) can be used to attach most computer speakers. The line-out jack is amplified, so speakers with integrated amplifiers are not required. Connect the audio cable from the speakers to this jack.

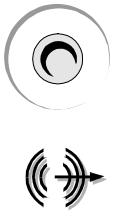


Figure B-11. Line-Out Jack

Line-In Jack

The line-in jack (see Figure B-12) can be used to attach record/playback devices such as cassette players, CD players, and VCRs. Connect the line-out cable from any of these devices to the line-in jack on the back of your computer.

Figure B-12. Line-In Jack

Interrupt Assignments

Problems can arise if two devices attempt to use the same IRQ line. To avoid this type of conflict, check the documentation for the default IRQ line setting for each installed device. Then consult Table B-9 to configure each device for one of the available IRQ or other lines.

NOTE: Interrupts for the on-board sound, NIC, and both SCSI channels are assigned dynamically by the system basic input/output system (BIOS).

Table B-9. Interrupt Assignments

IRQ Line	Used By/Available
IRQ0	System timer
IRQ1	Keyboard controller
IRQ2	Interrupt controller (enables IRQ8 through IRQ15)
IRQ3 and IRQ4	Serial ports
IRQ5	Available
IRQ6	Diskette drive interface
IRQ7	Parallel port
IRQ8	RTC
IRQ9	Available if ACPI is set to Off in System Setup program
IRQ10	Available
IRQ11	Available
IRQ12	Mouse controller
IRQ13	Math coprocessor
IRQ14	Primary EIDE interface (if Enabled in System Setup program)
IRQ15	Secondary EIDE interface (if Enabled in System Setup program)

NOTE: For the full name of an abbreviation or acronym used in the table, see the Glossary.

Memory Allocations

A processor and programs operating under MS-DOS (real-mode operation) can address only 1 megabyte (MB) (1024 kilobytes [KB]) of system memory. This area is

divided into *conventional memory* (sometimes called *base memory*) and upper memory. All system memory above this 1 MB is called *extended memory* and cannot be directly addressed by MS-DOS–based programs without the aid of some special memory-managing software.

Table B-10 provides a map of the conventional memory area. When the processor or a program addresses a location within the conventional memory range, it is physically addressing a location in main memory, which is the only main memory it can address under MS-DOS.

Table B-10. Conventional Memory Map

Address Range	Use
00000h–003FFh	Interrupt vector table
00400h–004FFh	BIOS data area
00500h–005FFh	MS-DOS and BASIC work area
00600h–0FFFFh	User memory
10000h–1FFFFh	User memory
20000h–2FFFFh	User memory
30000h–3FFFFh	User memory
40000h–4FFFFh	User memory
50000h–5FFFFh	User memory
60000h–6FFFFh	User memory
70000h–7FFFFh	User memory
80000h–8FFFFh	User memory
90000h–9FBFFh	User memory

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table B-11 provides a map of the upper memory area. Some of these addresses are dedicated to various system devices, such as the system BIOS. Others are available for use by expansion cards and/or an expanded memory manager (EMM). When the processor or a program addresses a location within the upper memory area, it is physically addressing a location within one of these devices.

Table B-11. Upper Memory Map

Address Range	Use
0009FC00–0009FFFF	PS/2-mouse data area
000A0000–000BFFFF	Video RAM
000C0000–000C7FFF	Video BIOS
000C8000–000EFFFF	Available
000F0000–000FFFFF	System BIOS
00100000–0010FFEF	High memory area
0010FFF0–7FFFFFFF	Extended memory
80000000–FFFBFFFF	Reserved
FFFC0000–FFFFFFFF	BIOS ROM

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

APPENDIX C
ISA Configuration Utility Messages

The ISA Configuration Utility (ICU) and its Configuration Manager are capable of identifying problems and alerting you to them. Both utilities can alert you to problems with card configuration as well as problems that prevent proper operation of the utility. This appendix describes each type of message and lists the possible causes and actions you can take to resolve any problems indicated by a message. See the following tables to locate your message and identify any possible corrective actions.

ICU Error Messages

The ICU can display a variety of error messages while in operation. These messages alert you to problems that prevent the ICU from running correctly, as well as informing you of resource conflicts that prevent the configuration of various cards in your computer. If you receive a message from the ICU, see Table C-1 for suggestions on resolving any problems indicated by the message.

Table C-1. Configuration Utility Messages

Message	Probable Cause	Corrective Action

`Out of memory`
 	
`Memory allocation failed`
	Either of these messages can appear if the system runs out of memory during your operation.	Disable any terminate-and-stay-resident (TSR) programs or any unneeded device drivers.

`Not enough memory to run the ICU`	This message appears when you start the ICU if the system does not have enough memory to run the utility.	
`Can't open index file. This file is required for ICU to run.`	The ICU cannot find the index file for its database.	Make sure to switch to drive A before attempting to start the utility.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-1. Configuration Utility Messages *(continued)*

Message	Probable Cause	Corrective Action
`No Configuration Manager.`	The device driver needed by the ICU is corrupted or is not correctly configured.	Verify that the following **device** statement appears in your **config.sys** file: `device=`*drive*`:\`*directory*`\drivers\dos\dwcfgmg.sys` In this statement, *drive* and *directory* represent the drive and directory where the driver resides. The default is `c:\plugplay`.

`At least one Plug and Play card in your system is not configured due to conflicts. These are marked "config err" in the list of configured cards.`
 	
`Due to conflicts, the ICU could only configure some Plug and Play cards in your system. Unconfigured cards are marked "config err" in the list of configured cards.`
	The Configuration Manager or the ICU cannot configure at least one Plug and Play expansion card because of resource conflicts with one or more cards.	You must reconfigure the conflicting card(s). To find the conflicting card, perform the following steps:
		
		1. Select the Plug and Play expansion card marked with `config err`, and then click Modify.
		
		The Card Configuration dialog box displays the functions assigned to the Plug and Play expansion card.
		
		2. Select a function and then click Settings. Click the Cancel button if the ICU does not display a message naming the conflicting card.
		
		3. Repeat step 2 until the ICU displays a message box naming the conflicting card and the resource(s) in conflict. See the following table entry for an explanation of this message box.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-1. Configuration Utility Messages *(continued)*

Message	Probable Cause	Corrective Action
`This device is unconfigurable because of a resource conflict with card card_name. The conflicting resource is resource_name. To fix, reconfigure the conflicting card.`	The selected card is unconfigurable because one of its resources is already being used by another device.	Perform the following procedure: **1. Make a note of the card name and the type of conflicting resource.** **2. Follow the procedure in "Modifying a Card" in Chapter 4, and change the value for *resource_name* used by *card_name*.**
`The ICU has successfully configured all Plug and Play cards in your system. For the new configuration to take effect, save the configuration, then reboot your system.`	The ICU has successfully configured all of the Plug and Play expansion cards that were not configured by the Configuration Manager.	To accept these settings, save the configuration information into NVRAM by selecting Exit from the File menu and then selecting Yes to save. You must reboot your system for these settings to take effect.
`The loaded card is not a category card. Press OK to proceed.`	The category you have chosen is not the correct category under which to add this card.	Select OK. The ICU automatically opens the correct category's dialog box. Continue the procedure for adding the card as described in "Adding a Listed Card" or "Adding an Unlisted Card" in Chapter 4.

`No more DMA values can be added.`
`No more interrupt values can be added.`
`No more memory values can be added.`
`No more I/O port values can be added.`
	No more values are available for the resource you are trying to add or modify.	The maximum number of values for each resource is as follows:
		• 4 DMA channels
		• 7 IRQ lines
		• 9 memory address blocks
		• 20 I/O ports
		To free values for the resource you are trying to add or modify, delete some of the values listed in the resource box for the card. If your card requires all of the values listed, contact your card manufacturer to resolve the issue.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-1. Configuration Utility Messages *(continued)*

Message	Probable Cause	Corrective Action
`The ICU detects a resource conflict between this card and` *`conflicting_card`*`.The conflicting resource was: resource.`	You added or modified a card that now requires a *`resource`* value already in use by *`conflicting_card`*.	Try each of the following options until the problem is resolved: • Modify the card you are adding so that it uses a different value for *resource*. See "Modifying a Card" in Chapter 4 for instructions. • Modify *`conflicting_card`* so that it uses a different value for *resource*. See "Modifying a Card" in Chapter 4 for instructions. • If *`conflicting_card`* is not the system board or riser board, remove it from the computer. See "Removing a Card" in Chapter 4 for instructions. • Remove all expansion cards from the ICU, and then add them back one at a time, beginning with the new card and resolving resource conflicts as they arise. See "Removing a Card" and "Adding a Listed Card" or "Adding an Unlisted Card" in Chapter 4 for instructions. • If you cannot resolve the resource conflict by any of the preceding methods, remove the new card. If you were modifying an existing card, reset the modified card to its previous resource value.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-1. Configuration Utility Messages *(continued)*

Message	Probable Cause	Corrective Action

`The configuration (.cfg) file used by the ICU for this card is now invalid or does not exist. Do you wish to load the file?`
 	
`No configuration (.cfg) file exists for the card being modified. Do you want to load one?`
	This message appears when you try to add a listed card and the configuration file for this card has been corrupted or deleted from the database.
	
	This message appears when you modify a card and its configuration file does not exist or has been deleted.
		You can get a copy of the configuration file from the original *ISA Configuration Utility Diskette* that you used to create the backup ICU diskette. Use the following procedure:
		
		1. Insert the original *ISA Configuration Utility Diskette* into drive A.
		
		2. Change to the db **subdirectory on the diskette drive.**
		
		3. Use a text editor to search the icu.ndx **file for the card ID of the card you want to add or modify.**
		
		The name of the configuration file is part of this card ID. For example, if the card ID is ICU0200, the configuration file is **!icu0200.cfg**.
		
		4. Copy the configuration file from the original ICU diskette to the backup diskette.

`This is an EISA system. Use an ECU, not the ICU, to configure your system.`	This message appears if you attempt to run the ICU on an EISA system.	To use the ICU, you must load the utility onto a non-EISA system.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-1. Configuration Utility Messages *(continued)*

Message	Probable Cause	Corrective Action
`You have added a card using settings different from factory default. Reconfigure the card to the settings in the next display (see the card's manual) before installing it.`	This message can appear in two situations: • You added an ISA expansion card, selected OK, and the ICU had to use resource values different from the card's defaults to avoid conflicts. • You added an ISA expansion card, selected Advanced, and chose resource values different from the card's defaults.	Make a note of the new card configuration shown in the Card Resource Usage dialog box displayed after this message. Change jumper settings on the ISA expansion card to match the new card configuration.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Configuration Manager Messages

The Configuration Manager for the ICU identifies problems following the system boot routine and generates messages if necessary. These messages alert you to any unsuccessful attempts to configure Plug and Play or Peripheral Component Interconnect (PCI) expansion cards, as well as any problems that interfere with the operation of the Configuration Manager. If you receive a message from the Configuration Manager, see Table C-2 for suggestions on resolving any problems indicated by the message.

Table C-2. Configuration Manager Messages

Message	Probable Cause	Corrective Action
`Found Plug and Play ISA card: Plug and Play ISA Card Name.`	This message appears at system start-up for each Plug and Play ISA expansion card recognized by the Configuration Manager.	Status message; no action is required.
`NOTICE: Boot Device Not Active! CSN=Card Select Number.`	A boot device was found to be inactive.	Status message; no action is required. The Configuration Manager automatically configures and activates the device.
`One or more active devices have been reconfigured -- system requires reboot. Press any key to reboot system.`	You modified the resource values of one or more PCI or Plug and Play ISA expansion cards.	Reboot the system to reconfigure the card(s).

`The Plug and Play ISA card has been successfully configured.`
 	
`Card Count Plug and Play ISA cards have been successfully configured.`
	The Configuration Manager has successfully configured the given number of cards.	If this message does not match the number of Plug and Play ISA expansion cards installed in your computer, reinstall any Plug and Play expansion cards not listed and reboot the system.

`ERROR: Insufficient CM Memory`	There is not enough memory available to the Configuration Manager for it to run.	Disable any TSR programs or any unneeded device drivers.
`ERROR: Fatal BIOS error Internal Error Code.`	A BIOS call failed with an internal error. The most likely cause is an incompatibility between the BIOS and the Configuration Manager.	See the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide* for instructions on obtaining technical assistance.
`ERROR: Could not read NVS, Error=Internal Error Code.`	An attempt to read the NVRAM failed.	See the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide* for instructions on obtaining technical assistance.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-2. Configuration Manager Messages *(continued)*

Message	Probable Cause	Corrective Action
ERROR: Failed NVS write. Error=*Internal Error Code*.	An attempt to write to NVRAM failed.	Run the Dell Diagnostics to verify the integrity of your system NVRAM. See the chapter titled "Running the Dell Diagnostics" in your *Diagnostics and Troubleshooting Guide* for instructions. If you are unable to determine the cause of the error, see the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide* for instructions on obtaining technical assistance.
ERROR: Failed to activate device, CSN=*Card Select Number*.	A Plug and Play expansion card could not be activated.	Use the following procedure: **1. Exit the ICU and turn off your system.** **2. Remove the Plug and Play expansion card that could not be activated.** Follow steps 2 through 5 of "Removing an Expansion Card" in Chapter 9, and then return to this procedure. **3. Reinstall the Plug and Play expansion card.** Follow steps 4 through 8 of "Installing an Expansion Card" in Chapter 9, and then return to this procedure. If you still receive the error message, contact the manufacturer of the Plug and Play expansion card for assistance.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-2. Configuration Manager Messages *(continued)*

Message	Probable Cause	Corrective Action

`WARNING: Could not configure Plug and Play Card Name.`
 	
`WARNING: Could not configure PCI device, ID=`*`DeviceID`*`.`
 	
`Failed to configure Number of Total Count Plug and Play ISA devices. Use your system's configuration utility to resolve conflicts. Press any key to continue.`
	The card(s) mentioned are not fully configured due to resource conflicts.	If you have documentation that lists the allowable resource values for your Plug and Play or PCI expansion card, you can use the following procedure to locate and resolve the resource conflict.
		
		NOTE: If you do not have documentation listing the allowable resource values, see the corrective action for these messages on the following page.
		
		1. Start the ICU.
		
		Any Plug and Play or PCI expansion cards that could not be configured should be marked `config err` in the list of cards in the ICU window.
		
		2. Select the System Resources option from the View menu.
		
		The System Resource Usage dialog box displays all resources currently used by the system.
		
		3. Select one of the resources used by your Plug and Play or PCI expansion card, and click the Used By Card button.
		
		The Card Resources Usage dialog box identifies which device is using the resource.
		
		4. Repeat step 3 until you have identified all conflicting resources and the cards that use them.
		
		5. Modify the cards as needed to free the resources required by the unconfigured Plug and Play or PCI expansion card.
		
		See "Modifying a Card" in Chapter 4 for instructions.

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table C-2. Configuration Manager Messages *(continued)*

Message	Probable Cause	Corrective Action

`WARNING: Could not configure Plug and Play Card Name.`
 	
`WARNING: Could not configure PCI device, ID=DeviceID.`
 	
`Failed to configure Number of Total Count Plug and Play ISA devices. Use your system's configuration utility to resolve conflicts. Press any key to continue.`
	The card(s) mentioned are not fully configured due to resource conflicts.	If you do not know the allowable resource values for your Plug and Play or PCI expansion card, use the following procedure to locate and resolve the resource conflict:
		
		1. Remove all card configurations from the ICU.
		
		See "Removing a Card" in Chapter 4 for instructions.
		
		2. Reboot your system.
		
		The ICU should automatically configure your Plug and Play or PCI expansion card.
		
		3. Add the ISA expansion cards back into the ICU, resolving any resource conflicts as they arise.
		
		See "Adding a Listed Card" in Chapter 4 for instructions.
		
		If your Plug and Play or PCI expansion card is not automatically configured when you reboot the system with all other cards removed, you should contact the manufacturer of the card or see the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide*.

`WARNING: Boot Device conflict detected! CSN=`*`Card Select Number`* `Error=`*`Error`*`.`	One of the devices is attempting to use one or more resources assigned to the system's boot device.	Perform the following procedure: **1. Start the ICU.** **2. Identify the card marked** `config err`**.** This card is attempting to use one or more resources required by the system's boot device. **3. Follow the procedure for the preceding error message in this table.**

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

APPENDIX D
Maintaining the System

Proper use of preventive maintenance procedures can keep the system in top operating condition and minimize the need for costly, time-consuming service procedures. This appendix contains maintenance procedures that you should perform regularly.

Data Preservation

Everyone inadvertently deletes files at one time or another. Also, hard-disk drives can fail after extended use, so it is not a question of *whether* you will eventually lose data, but *when*. To avoid such loss of data, you should regularly make backup copies of all hard-disk drive files. Frequent, regular backups are a must for anyone using a hard-disk drive.

Scheduling Backups

The frequency with which backups should be made depends on the amount of storage space on a hard-disk drive and the volatility of the data contained on the drive. Heavily used systems require more frequent backups than systems in which files are seldom changed.

Dell recommends that you back up the hard-disk drive at least once a week, with a daily backup of those files known to have been changed. Following these guidelines ensures the loss of no more than a day's work in the event of a hard-disk drive failure or if you inadvertently delete one or more important files.

As further insurance against data losses, you should keep duplicate copies of the weekly and monthly backups at an off-site location. Doing this ensures that you lose no more than a week's work, even if one of the on-site backups becomes corrupted.

Backup Devices

Tape drives are fast, convenient, and affordable devices that can back up data at rates of up to 1.6 megabytes per second (MB/sec) (sustained, with data compression) and can often run unattended. Dell offers tape drives with storage capacities in the range of 200 MB to 8 gigabytes (GB) per tape cartridge and recommends these drives and their associated backup software for use as system backup devices.

As a last resort, you can back up a hard-disk drive's contents on diskettes, a method that is both time-consuming and prone to human error. Also, backing up a full 540-MB hard-disk drive requires approximately 375 diskettes (when using 144-MB diskettes). Therefore, if it is absolutely necessary to use diskettes as backup devices, any unwanted hard-disk drive files should be deleted before a backup procedure is started.

Recovering Data

Some hard-disk drive failures are recoverable. In these cases you may be able to recover all lost data if the proper utility software is available. Even losses such as accidentally deleted files or accidental reformatting of a hard-disk drive can be reversed with these utilities.

If the computer system is running MS-DOS, many apparent data loss problems are due to corruption or erasure of the hard-disk drive's master boot record (MBR), MS-DOS boot sector, or file allocation table (FAT). That is, accidental deletion of files or accidental reformatting of the hard-disk drive alters the MS-DOS boot sector, the FAT, and the root directory.

However, such accidents do not actually erase the contents of the hard-disk drive files until new data is written to the sectors containing these files. With software such as the Norton Utilities, Mace Utilities, or PC-Tools Deluxe, the data stored in these areas can often be restored, meaning that you can recover most, if not all, of the data.

Unlike formatting a hard-disk drive, formatting a diskette completely erases all the data on the diskette unless you use the diskette formatting program included in the Mace Utilities.

For a complete description of data recovery procedures and the software needed to perform them, see *The Paul Mace Guide to Data Recovery*, published by Brady.

Cleaning System Components

An exhaust fan in the power supply cools the power supply and computer by drawing air in through various openings in the computer and blowing it out the back. However, the fan also draws dust and other particles into the computer, causing contaminant buildup, which results in an increase in the system's internal temperature and interferes with the operation of various system components.

To avoid these conditions, Dell recommends keeping your work environment clean to reduce the amount of dust and dirt around the computer, thereby reducing the amount of contaminants drawn into the computer by the power supply fan. In particular, you should keep the exterior of your computer and monitor clean, and you should use a commercially available diskette-drive head-cleaning kit to remove contaminants inside your diskette drives.

Recommended Tools and Accessories

Dell recommends that you use the following tools and accessories when you clean the computer:

- *A wrist grounding strap* — The proper use of a wrist grounding strap reduces the effect of electrostatic discharge (ESD), which can damage certain computer components. To use a wrist grounding strap, place the strap around your wrist and attach the other end of the strap to an unpainted metal surface in the chassis, such as the power supply bracket, that is connected to chassis ground.
- *A liquid dishwashing detergent* — Use a mixture of one part liquid dishwashing detergent and three parts water to clean the exterior of the computer, monitor(s), and keyboard. You can also add fabric softener to produce an antistatic solution that prevents dust from being attracted to the monitor screen.
- *A soft, lint-free cleaning cloth* — Moisten the cleaning cloth with the dishwashing detergent solution to clean the exterior of the computer system.
- *A nonabrasive diskette-drive head-cleaning kit* — Dell recommends that you use a kit that contains pretreated diskettes in individually sealed packages. These kits ensure that the cleaning solution is applied evenly over the entire diskette-drive head surface, and they prevent contamination of the heads by exposure to foreign substances.
- *A small vacuum cleaner with a brush attachment* — Use the vacuum cleaner to remove dust and dirt from the exterior of the computer and keyboard.

Cleaning the Computer, Monitor, and Keyboard Exteriors

A conventional monitor or keyboard cover minimizes the accumulation of dust and other debris inside the monitor and keyboard when they are not in use. Also, commercially available keyboard membrane covers make it possible to use the keyboard while providing protection against foreign particles.

However, regardless of any protective covers, the monitor and keyboard must be cleaned occasionally. To clean the exterior of the computer, monitor, and keyboard, follow these steps:

1. **Turn off the computer, monitor, and any other attached peripherals, and disconnect them from their power sources.**
2. **Use a vacuum cleaner to remove any dust from the slots and holes on the computer and between the keys on the keyboard.**
3. **Moisten a soft cleaning cloth with a solution of three parts water and one part liquid dishwashing detergent.**

   Do not soak the cloth in the solution; you must not let the solution drip inside the computer or keyboard.
4. **Use the moistened cloth to wipe the computer cover, the keyboard, and the exterior of the monitor, including the screen.**

Cleaning Drives

You can clean the heads of your diskette drives by using a commercially available diskette-drive head-cleaning kit. These kits include diskettes pretreated with a chemical solution to nonabrasively remove contaminants that accumulate on the drive heads during normal operation.

If the kit does not contain instructions, insert one of the pretreated diskettes into a diskette drive and turn on the system. After 20 or 30 seconds, remove the diskette from the drive. Repeat this procedure for each diskette drive in the computer.

CAUTION: Do not attempt to clean drive heads with a swab. You may accidentally misalign the heads, rendering the drive inoperable.

Environmental Factors

This section discusses various environmental factors that can adversely affect system performance and longevity.

Temperature

Temperature extremes can cause a variety of problems, including premature aging and failure of chips or mechanical failure of devices. Extreme temperature fluctuations can cause chips to become loose in their sockets and can cause expansion and contraction of disk drive platters, resulting in read or write data errors. When you perform a low-level format operation on a hard-disk drive, it is important to ensure that the drive's surrounding temperature is at or near the temperature at which the drive will be operated. Failure to do so can result in relocation of the tracks on the disk platters.

To minimize the negative effects of temperature on system performance, follow these guidelines:

- Ensure that the system is operated in an environment no colder than 10° Celsius (C) (50° Fahrenheit [F]) or hotter than 35°C (95°F).
- Ensure that the system has adequate ventilation. Do not place it within a closed-in wall unit or on top of cloth material, which can act as insulation. Do not place it where it will receive direct sunlight, particularly in the afternoon. Do not place it next to a heat source of any kind, including heating vents during winter.

  Adequate ventilation is particularly important at high altitudes. System performance may not be optimum when the system is operating at high temperatures as well as high altitudes.
- Make sure that all slots and openings on the computer remain unobstructed, especially the fan vent on the back of the computer.
- Clean the system at regular intervals to avoid any buildup of dust and debris, which can cause a system to overheat.
- If the system has been exposed to abnormally cold temperatures, allow a two-hour warm-up period to bring it up to normal operating temperature before

turning it on. Failure to do so may cause damage to internal components, particularly the hard-disk drive.

- If intermittent system failures are noticed, try reseating any socketed chips, which might have become loose due to temperature fluctuations.

Humidity

High-humidity conditions can cause moisture migration and penetration into the computer. This moisture can cause corrosion of internal components and degradation of properties such as electrical resistance, thermal conductivity, physical strength, and size. Extreme moisture buildup inside the computer can result in electrical shorts, which can cause serious damage to the computer.

Each Dell system is rated to operate at 20 to 80 percent relative humidity, with a humidity gradation of 10 percent per hour. In storage, a Dell system can withstand from 5 to 95 percent relative humidity.

Buildings in which climate is controlled by air-conditioning in the warmer months and by heat during the colder months usually maintain an acceptable level of humidity for computer equipment. However, if a system is located in an unusually humid location, a dehumidifier can be used to maintain the humidity within an acceptable range.

Altitude

Operating a system at high altitude (low pressure) reduces the efficiency of forced and convection cooling and can result in electrical problems related to arcing and corona effects. This condition can also cause sealed components with internal pressure, such as electrolytic capacitors, to fail or perform at reduced efficiency.

Each Dell system is rated to operate at altitudes from –16 to 3048 meters (m) (–50 to 10,000 feet [ft]) and can be stored at altitudes of –16 to 10,600 m (–50 to 35,000 ft). At 35°C (95°F), the maximum operating altitude is 914 m (3000 ft).

Dust and Particles

A clean operating environment can greatly reduce the negative effects of dust and other particles, which act as insulators and interfere with the operation of a system's mechanical components. Also, in addition to regular cleaning, you should follow these guidelines to deter contamination of the computer equipment:

- Do not permit smoking anywhere near the system.
- Do not permit food or drink near the system.
- Use dust covers when the system is not in use.
- Keep 5.25-inch diskettes in their paper sleeves, and keep all diskettes in a closed diskette box when not in use.
- Close windows and outside doors to keep out airborne particles.

Corrosion

The oil from a person's fingers or prolonged exposure to high temperature or humidity can corrode the gold-plated edge connectors and pin connectors on various devices in the computer. This corrosion on computer connectors is a gradual process that can eventually lead to intermittent failures of electrical circuits.

To prevent corrosion, you should avoid touching contacts on boards and cards. Protecting the system from corrosive elements is especially important in moist and salty environments, which tend to promote corrosion. Also, as a further deterrent to corrosion, the system should not be used in extreme temperatures, as explained in "Temperature" found earlier in this appendix.

ESD

ESD results from the buildup of static electricity on the human body and certain other objects. This static electricity is often produced by simple movements such as walking across a carpet. ESD is a discharge of a static electrical charge that occurs when a person whose body contains such a charge touches a component in the computer. This static discharge can cause components, especially chips, to fail. ESD is a problem particularly in dry environments where the relative humidity is below 50 percent. To reduce the effects of ESD, you should observe the following guidelines:

- When working inside the computer, wear a wrist grounding strap. If a wrist grounding strap is unavailable, touch an unpainted metal surface on the chassis periodically to neutralize any static charge.
- If at all possible, stand on a concrete floor while working inside the computer.
- Use an antistatic floor mat when working inside the computer.
- If it is necessary to work in a carpeted area, spray the carpet with an antistatic spray and allow it to dry before beginning to work inside the computer.
- Keep components in their antistatic packaging until they are installed.
- Avoid wearing clothing made of wool or synthetic materials.

Electromagnetic and Radio Frequency Interference

Electromagnetic interference (EMI) and radio frequency interference (RFI) from a computer can adversely affect devices such as radio and television (TV) receivers operating near the computer. Radio frequencies emanating from a computer system can also interfere with cordless and low-power telephones. Conversely, RFI from high-power telephones can cause spurious characters to appear on the system's monitor screen.

RFI is defined as any EMI with a frequency above 10 kilohertz (kHz). This type of interference can travel from the computer to other devices through the AC power cable and power source or through the air like transmitted radio waves. The Federal Communications Commission (FCC) publishes specific regulations to limit the amount of EMI and RFI emitted by computing equipment. Each Dell system meets these FCC regulations.

To reduce the possibility of EMI and RFI, follow these guidelines:

- Operate the system only with the computer cover installed.
- Ensure that all expansion slots are covered either by a card-mounting bracket or by a metal filler bracket and that all drive bays have a drive and/or a metal insert installed. These brackets and metal inserts are available from Dell.
- Ensure that the screws on all peripheral cable connectors are securely fastened to their corresponding connectors on the back of the computer.
- Always use shielded cables with metal connector shells for attaching peripherals to the computer.

To prevent the possibility of RFI from a computer affecting TV reception, follow these guidelines:

- Keep any TV set at least 6 ft away from the computer system.
- Use cable TV when possible.
- Use a directional outdoor TV antenna.
- Attach line filters to the TV set.
- Use 75-ohm coaxial cable for the TV set rather than twin-lead antenna wire.
- If interference occurs, rotate the computer or the TV set 90 degrees.

Magnetism

Because they store data magnetically, diskettes and hard-disk drives are extremely susceptible to the effects of magnetism. Diskettes should never be stored near magnetic sources such as the following:

- Monitors
- TV sets
- Printers
- Telephones with real bells
- Fluorescent lights

Shock and Vibration

Excessive shock can damage the function, external appearance, and physical structure of a system. Each Dell system has been designed to operate properly after withstanding a minimum of six consecutively executed shock pulses in the positive and negative x, y, and z axes. Each shock pulse can measure up to 50 gravities (G) (half-sine wave) for up to 2 milliseconds (ms). In storage, the system can withstand shock pulses of 110 G (half-sine wave) for 2 ms or 27 G (square wave) for 15 ms.

Excessive vibration can cause the same problems as mentioned earlier for shock, as well as cause components to become loose in their sockets or connectors. Systems can be subject to significant vibration when being transported by vehicle or when operated in an environment with machinery that causes vibration.

Each Dell system, when operating, is designed to withstand 0.25 G (half-sine wave) at a sweep of 3 to 200 hertz (Hz) for 30 minutes. In storage, the system can withstand 0.5 G at 3 to 200 Hz for 30 minutes.

Power Source Interruptions

Computer systems are especially sensitive to variations in voltage supplied by the AC power source. Overvoltage, undervoltage, and transients (or *spikes*) can erase data from memory or even cause components to fail. To protect against these types of problems, power cables should always be properly grounded and one or both of the following methods should be used:

- Use one of the power protection devices described in the following section, "Power Protection Devices."
- Place the system on a dedicated power circuit (rather than having it share a circuit with other heavy electrical equipment). In general, do not allow the system to share a circuit with any of the following:
  - Kitchen appliances
  - Copier machines
  - Air conditioners
  - Vacuum cleaners
  - Space heaters
  - Power tools
  - Teletype machines
  - Adding machines
  - Laser printers
  - Facsimile machines
  - Any other motorized equipment

Besides these appliances, the greatest threat to a system's supply of power are surges or blackouts caused by electrical storms. Whenever possible, turn off the computer and any peripherals and unplug them from their power sources during thunderstorms.

If a blackout occurs—even a temporary one—while the system is turned on, turn off the system immediately and disconnect it from its power source. Leaving the system on may cause problems when the power is restored; all other appliances left on in the area can create large voltage spikes that can damage the system.

Power Protection Devices

A number of devices are available that protect against power problems, such as power surges, transients, and power failures. The following subsections describe some of these devices.

Surge Protectors

Surge protectors are available in a variety of types and usually provide a level of protection commensurate with the cost of the device. Surge protectors prevent voltage spikes, such as those caused during an electrical storm, from entering a system through the AC power source. Surge protectors, however, do not offer protection against brownouts, which occur when the voltage drops more than 20 percent below the normal AC line voltage level.

Line Conditioners

Line conditioners go beyond the overvoltage protection of surge protectors. Line conditioners keep a computer's AC power source voltage at a fairly constant level and, therefore, can handle brownouts. Because of this added protection, line conditioners cost more than surge protectors—up to several hundred dollars. However, these devices cannot protect against a complete loss of power.

Uninterruptible Power Supplies

Uninterruptible power supply (UPS) systems offer the most complete protection against variations in power because they use battery power to keep the system running when AC power is lost. AC power, while available, charges the battery; when AC power is lost, the battery can provide power to the system for a limited amount of time—from 15 minutes to an hour or so—depending on the UPS system.

UPS systems range in price from a few hundred dollars to several thousand dollars, with the more expensive units allowing you to run larger systems for a longer period of time when AC power is lost. UPS systems that provide only 5 minutes of battery power let you conduct an orderly shutdown of the system, but are not intended to provide continued operation. Surge protectors should be used with all UPS systems, and the UPS system should be Underwriters Laboratories (UL) safety-approved.

APPENDIX E
Regulatory Notices

Electromagnetic Interference (EMI) is any signal or emission, radiated in free space or conducted along power or signal leads, that endangers the functioning of a radio navigation or other safety service or seriously degrades, obstructs, or repeatedly interrupts a licensed radio communications service. Radio communications services include but are not limited to AM/FM commercial broadcast, television, cellular services, radar, air-traffic control, pager, and Personal Communication Services (PCS). These licensed services, along with unintentional radiators such as digital devices, including computer systems, contribute to the electromagnetic environment.

Electromagnetic Compatibility (EMC) is the ability of items of electronic equipment to function properly together in the electronic environment. While this computer system has been designed and determined to be compliant with regulatory agency limits for EMI, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference with radio communications services, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the computer and the receiver are on different branch circuits.

If necessary, consult a Regulatory EMC representative of Dell Computer Corporation or an experienced radio/television technician for additional suggestions. You may find the *FCC Interference Handbook, 1986*, to be helpful. It is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00450-7 or on the World Wide Web at **http://www.fcc.gov/Bureaus/Compliance/WWW/tvibook.html.**

Dell computer systems are designed, tested, and classified for their intended electromagnetic environment. These electromagnetic environment classifications generally refer to the following harmonized definitions:

- Class A is for business or industrial environments.
- Class B is for residential environments.

Information Technology Equipment (ITE), including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, that are integrated into or connected to the system should match the electromagnetic environment classification of the computer system.

A Notice About Shielded Signal Cables: Use only shielded cables for connecting peripherals to any Dell device to reduce the possibility of interference with radio communications services. Using shielded cables ensures that you maintain the appropriate EMC classification for the intended environment. For parallel printers, a cable is available from Dell Computer Corporation. If you prefer, you can order a cable from Dell Computer Corporation on the World Wide Web at http://www.dell.com/products/dellware/index.htm.

Most Dell computer systems are classified for Class B environments. To determine the electromagnetic classification for your system or device, refer to the following sections specific for each regulatory agency. Each section provides country-specific EMC/EMI or product safety information.

FCC Notices (U.S. Only)

Most Dell computer systems are classified by the Federal Communications Commission (FCC) as Class B digital devices. However, the inclusion of certain options can change the rating of some configurations to Class A. To determine which classification applies to your computer system, examine all FCC registration labels located on the bottom or back panel of your computer, on card-mounting brackets, and on the cards themselves. If any one of the labels carries a Class A rating, your entire system is considered to be a Class A digital device. If *all* labels carry either the Class B rating distinguished by either an FCC ID number or the FCC logo, (FC), your system is considered to be a Class B digital device.

Once you have determined your system's FCC classification, read the appropriate FCC notice. Note that FCC regulations provide that changes or modifications not expressly approved by Dell Computer Corporation could void your authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Class A

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio

frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

Class B

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause interference with radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

The following information is provided on the device or devices covered in this document in compliance with FCC regulations:

- Product name: Dell Precision 610
- Model number: MMP
- Company name: Dell Computer Corporation
  EMC Engineering Department
  One Dell Way
  Round Rock, Texas 78682 USA
  512-338-4400

IC Notice (Canada Only)

Most Dell computer systems (and other Dell digital apparatus) are classified by the Industry Canada (IC) Interference-Causing Equipment Standard #3 (ICES-003) as Class B digital devices. To determine which classification (Class A or B) applies to your computer system (or other Dell digital apparatus), examine all registration labels located on the bottom or the back panel of your computer (or other digital apparatus). A statement in the form of "IC Class A ICES-3" or "IC Class B ICES-3" will be located on one of these labels. Note that Industry Canada regulations provide that changes or

modifications not expressly approved by Dell Computer Corporation could void your authority to operate this equipment.

This Class B (or Class A, if so indicated on the registration label) digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe B (ou Classe A, si ainsi indiqué sur l'étiquette d'enregistration) respecte toutes les exigences du Reglement sur le Materiel Brouilleur du Canada.

CE Notice (European Union)

Marking by the symbol CE indicates compliance of this Dell system to the EMC Directive and the Low Voltage Directive of the European Union. Such marking is indicative that this Dell system meets the following technical standards:

- EN 55022 — "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."
- EN 50082-1: 1992 — "Electromagnetic compatibility—Generic immunity standard Part 1: Residential, commercial, and light industry."
- EN 60950 — "Safety of Information Technology Equipment."

NOTE: EN 55022 emissions requirements provide for two classifications:

- *Class A is for typical commercial areas.*
- *Class B is for typical domestic areas.*

This Dell device is classified for use in a typical Class B domestic environment.

A "Declaration of Conformity" in accordance with the preceding directives and standards has been made and is on file at Dell Products Europe BV, Limerick, Ireland.

EN 55022 Compliance (Czech Republic Only)

This device belongs to Class B devices as described in EN 55022, unless it is specifically stated that it is a Class A device on the specification label. The following applies to devices in Class A of EN 55022 (radius of protection up to 30 meters). The user of the device is obliged to take all steps necessary to remove sources of interference to telecommunication or other devices.

Pokud není na typovém štitku počítače uvedeno, že spadá do třídy A podle EN 55022, spadá automaticky do třídy B podle EN 55022. Pro zařízení zařazená do třídy A (ochranné pásmo 30m) podle EN 55022 platí následující. Dojde-li k rušení telekomunikačních nebo jinych zařízení, je uživatel povinen provést taková opatření, aby rušení odstranil.

VCCI Notice (Japan Only)

Most Dell computer systems are classified by the Voluntary Control Council for Interference (VCCI) as Class B information technology equipment (ITE). However, the inclusion of certain options can change the rating of some configurations to Class A. ITE, including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, integrated into or connected to the system, should match the electromagnetic environment classification (Class A or B) of the computer system.

To determine which classification applies to your computer system, examine the regulatory labels/markings (see Figures E-1 and E-2) located on the bottom or back panel of your computer. Once you have determined your system's VCCI classification, read the appropriate VCCI notice.

Class A ITE

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

VCCI-A

Figure E-1. VCCI Class A ITE Regulatory Mark

Class B ITE

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスＢ情報技術装置です。この装置は家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用させると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

This is a Class B product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

Figure E-2. VCCI Class B ITE Regulatory Mark

MOC Notice (South Korea Only)

To determine which classification (Class A or B) applies to your computer system (or other Dell digital device), examine the South Korean Ministry of Communications (MOC) registration labels located on your computer (or other Dell digital device). The MOC label may be located separately from the other regulatory marking applied to your product. The English text, "EMI (A)," for Class A products, or "EMI (B)" for Class B products, appears in the center of the MOC label (see Figures E-3 and E-4).

NOTE: MOC emissions requirements provide for two classifications:

- *Class A devices are for business purposes.*
- *Class B devices are for nonbusiness purposes.*

Class A Device

장치 종류	사용자 안내문
A급 기기	이 장치는 업무용으로 전자파 적합등록을 한 장치이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Please note that this device has been approved for business purposes with regard to electromagnetic interference. If you find that this device is not suitable for your use, you may exchange it for a nonbusiness device.

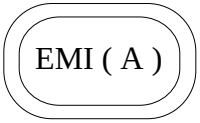


Figure E-3. MOC Class A Regulatory Mark

Class B Device

장치 종류	사용자 안내문
B급 기기	이 장치는 가정용으로 전자파 적합등록을 한 장치로서 주거지역에서는 물론 모든 지역에서 사용할 수 있습니다.

Please note that this device has been approved for nonbusiness purposes and may be used in any environment, including residential areas.

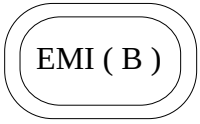


Figure E-4. MOC Class B Regulatory Mark

Polish Center for Testing and Certification Notice

The equipment should draw power from a socket with an attached protection circuit (a three-prong socket). All equipment that works together (computer, monitor, printer, and so on) should have the same power supply source.

The phasing conductor of the room's electrical installation should have a reserve short-circuit protection device in the form of a fuse with a nominal value no larger than 10 amperes (A).

To completely switch off the equipment, the power supply cable must be removed from the power supply socket, which should be located near the equipment and easily accessible.

A protection mark “B” confirms that the equipment is in compliance with the protection usage requirements of standards PN-93/T-42107 and PN-89/E-06251.

Wymagania Polskiego Centrum Badań i Certyfikacji

Urządzenie powinno być zasilane z gniazda z przyłączonym obwodem ochronnym (gniazdo z kołkiem). Współpracujące ze sobą urządzenia (komputer, monitor, drukarka) powinny być zasilane z tego samego źródła.

Instalacja elektryczna pomieszczenia powinna zawierać w przewodzie fazowym rezerwową ochronę przed zwarciami, w postaci bezpiecznika o wartości znamionowej nie większej niż 10A (amperów).

W celu całkowitego wyłączenia urządzenia z sieci zasilania, należy wyjąć wtyczkę kabla zasilającego z gniazdka, które powinno znajdować się w pobliżu urządzenia i być łatwo dostępne.

Znak bezpieczeństwa "B" potwierdza zgodność urządzenia z wymaganiami bezpieczeństwa użytkowania zawartymi w PN-93/T-42107 i PN-89/E-06251.

Pozostałe instrukcje bezpieczeństwa

- Nie należy używać wtyczek adapterowych lub usuwać kołka obwodu ochronnego z wtyczki. Jeżeli konieczne jest użycie przedłużacza to należy użyć przedłużacza 3-żyłowego z prawidłowo połączonym przewodem ochronnym.
- System komputerowy należy zabezpieczyć przed nagłymi, chwilowymi wzrostami lub spadkami napięcia, używając eliminatora przepięć, urządzenia dopasowującego lub bezzakłóceniowego źródła zasilania.
- Należy upewnić się, aby nic nie leżało na kablach systemu komputerowego, oraz aby kable nie były umieszczone w miejscu, gdzie można byłoby na nie nadeptywać lub potykać się o nie.
- Nie należy rozlewać napojów ani innych płynów na system komputerowy.
- Nie należy wpychać żadnych przedmiotów do otworów systemu komputerowego, gdyż może to spowodować pożar lub porażenie prądem, poprzez zwarcie elementów wewnętrznych.
- System komputerowy powinien znajdować się z dala od grzejników i źródeł ciepła. Ponadto, nie należy blokować otworów wentylacyjnych. Należy unikać kładzenia luźnych papierów pod komputer oraz umieszczania komputera w ciasnym miejscu bez możliwości cyrkulacji powietrza wokół niego.

NOM Information (Mexico Only)

The following information is provided on the device(s) described in this document in compliance with the requirements of the official Mexican standards (NOM):

Exporter:	Dell Computer Corporation One Dell Way Round Rock, TX 78682
Importer:	Dell Computer de México, S.A. de C.V. Rio Lerma No. 302 - 4° Piso Col. Cuauhtemoc 16500 México, D.F.
Ship to:	Dell Computer de México, S.A. de C.V. al Cuidado de Kuehne & Nagel de México S. de R.I. Avenida Soles No. 55 Col. Peñon de los Baños 15520 México, D.F.
Supply voltage:	115/230 VAC
Frequency:	60/50 Hz
Current consumption:	6.0/3.0 A

Información para NOM (únicamente para México)

La información siguiente se proporciona en el dispositivo o en los dispositivos descritos en este documento, en cumplimiento con los requisitos de la Norma Oficial Mexicana (NOM):

Exportador:	Dell Computer Corporation One Dell Way Round Rock, TX 78682
Importador:	Dell Computer de México, S.A. de C.V. Rio Lerma No. 302 - 4° Piso Col. Cuauhtemoc 16500 México, D.F.
Embarcar a:	Dell Computer de México, S.A. de C.V. al Cuidado de Kuehne & Nagel de México S. de R.I. Avenida Soles No. 55 Col. Peñon de los Baños 15520 México, D.F.
Tensión alimentación:	115/230 VAC
Frecuencia:	60/50 Hz
Consumo de corriente:	6.0/3.0 A

APPENDIX F
Warranties and Return Policy

Limited Three-Year Warranty (U.S. and Canada Only)

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. Dell warrants that the hardware products it manufactures will be free from defects in materials and workmanship. The warranty term is three years beginning on the date of invoice, as described in the following text.

Damage due to shipping the products to you is covered under this warranty. Otherwise, this warranty does not cover damage due to external causes, including accident, abuse, misuse, problems with electrical power, servicing not authorized by Dell, usage not in accordance with product instructions, failure to perform required preventive maintenance, and problems caused by use of parts and components not supplied by Dell.

This warranty does not cover any items that are in one or more of the following categories: software; external devices (except as specifically noted); accessories or parts added to a Dell system after the system is shipped from Dell; accessories or parts added to a Dell system through Dell's system integration department; accessories or parts that are not installed in the Dell factory; or DellWare® products. Monitors, keyboards, and mice that are Dell-branded or that are included on Dell's standard price list are covered under this warranty; all other monitors, keyboards, and mice (including those sold through the DellWare program) are not covered. Batteries for portable computers are covered only during the initial one-year period of this warranty.

Coverage During Year One

During the one-year period beginning on the invoice date, Dell will repair or replace products covered under this limited warranty that are returned to Dell's facility. To request warranty service, you must call Dell's Customer Technical Support within the warranty period. Refer to the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide* to find the appropriate telephone number for obtaining customer assistance. If warranty service is required, Dell will issue a Return Material Authorization Number. You must ship the products back to Dell in their original or equivalent packaging, prepay shipping charges, and insure the shipment or accept the risk of loss or damage during shipment. Dell will ship the repaired or replacement

products to you freight prepaid if you use an address in the continental U.S. or Canada, where applicable. Shipments to other locations will be made freight collect.

NOTE: Before you ship the product(s) to Dell, back up the data on the hard-disk drive(s) and any other storage device(s) in the product(s). Remove any removable media, such as diskettes, CDs, or PC Cards. Dell does not accept liability for lost data or software.

Dell owns all parts removed from repaired products. Dell uses new and reconditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If Dell repairs or replaces a product, its warranty term is not extended.

Coverage During Years Two and Three

During the second and third years of this limited warranty, Dell will provide, on an exchange basis and subject to Dell's Exchange Policy in effect on the date of the exchange, replacement parts for the Dell hardware product(s) covered under this limited warranty when a part requires replacement. You must report each instance of hardware failure to Dell's Customer Technical Support in advance to obtain Dell's concurrence that a part should be replaced and to have Dell ship the replacement part. Dell will ship parts (freight prepaid) if you use an address in the continental U.S. or Canada, where applicable. Shipments to other locations will be made freight collect. Dell will include a prepaid shipping container with each replacement part for your use in returning the replaced part to Dell. Replacement parts are new or reconditioned. Dell may provide replacement parts made by various manufacturers when supplying parts to you. The warranty term for a replacement part is the remainder of the limited warranty term.

You will pay Dell for replacement parts if the replaced part is not returned to Dell. The process for returning replaced parts, and your obligation to pay for replacement parts if you do not return the replaced parts to Dell, will be in accordance with Dell's Exchange Policy in effect on the date of the exchange.

You accept full responsibility for your software and data. Dell is not required to advise or remind you of appropriate backup and other procedures.

General

DELL MAKES NO EXPRESS WARRANTIES OR CONDITIONS BEYOND THOSE STATED IN THIS WARRANTY STATEMENT. DELL DISCLAIMS ALL OTHER WARRANTIES AND CONDITIONS, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES (OR JURISDICTIONS) DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES OR CONDITIONS, SO THIS LIMITATION MAY NOT APPLY TO YOU.

DELL'S RESPONSIBILITY FOR MALFUNCTIONS AND DEFECTS IN HARDWARE IS LIMITED TO REPAIR AND REPLACEMENT AS SET FORTH IN THIS WARRANTY STATEMENT. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS, AND YOU

MAY ALSO HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE (OR JURISDICTION).

DELL DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS WARRANTY STATEMENT OR LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST DATA OR SOFTWARE.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE PRECEDING EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

These provisions apply to Dell's limited three-year warranty only. For provisions of any service contract covering your system, refer to the separate service contract that you will receive.

If Dell elects to exchange a system or component, the exchange will be made in accordance with Dell's Exchange Policy in effect on the date of the exchange.

NOTE: If you chose one of the available warranty and service options in place of the standard limited three-year warranty described in the preceding text, the option you chose will be listed on your invoice.

"Total Satisfaction" Return Policy (U.S. and Canada Only)

If you are an end-user customer who bought products directly from a Dell company, you may return them to Dell up to 30 days from the date of invoice for a refund of the product purchase price if already paid. This refund will not include any shipping and handling charges shown on your invoice. If you are an organization who bought the products from Dell under a written agreement with Dell, there may be different terms for the return of products under this policy, based on your agreement with Dell. To return products, you must call Dell Customer Service (at the telephone number listed in the chapter titled "Getting Help" in your *Diagnostics and Troubleshooting Guide*) to receive a Credit Return Authorization Number. You must ship the products to Dell in their original packaging, prepay shipping charges, and insure the shipment or accept the risk of loss or damage during shipment. You may return software for refund or credit only if the sealed package containing the diskette(s) or CD(s) is unopened. Returned products must be in as-new condition, and all of the manuals, diskette(s), CD(s), power cables, and other items included with a product must be returned with it.

This "Total Satisfaction" Return Policy does not apply to DellWare products, which may be returned under DellWare's then-current return policy.

Glossary

The following list defines or identifies technical terms, abbreviations, and acronyms used in Dell® user documents.

NOTE: Unless otherwise specified, these definitions may apply only to the Microsoft® Windows® 95 and Windows NT® operating systems.

A

Abbreviation for ampere(s).

AC

Abbreviation for alternating current.

ACPI

Abbreviation for Advanced Configuration and Power Interface. ACPI enables operating-system-directed power management rather than system BIOS-directed power management. In addition, it provides a generic system event mechanism for Plug and Play and an interface for configuration control.

adapter card

An expansion card that plugs into an expansion-card connector on the computer's system board. An adapter card adds some specialized function to the computer by providing an interface between the expansion bus and a peripheral device. Examples of adapter cards include network cards, sound cards, and SCSI adapters.

ADI

Abbreviation for Autodesk Device Interface.

AGP

Abbreviation for accelerated graphics port. AGP is a dedicated graphics port that provides a faster interface between the video subsystem and system memory than a PCI graphics device and allows conventional memory to be used for video-related tasks. The improved interface enables AGP to deliver a smooth, true-color video image.

application program

Software, such as a spreadsheet or word processor, designed to help you perform a specific task or series of tasks. Application programs run from the operating system.

ASCII

Acronym for American Standard Code for Information Interchange. A text file containing only characters from the ASCII character set (usually created with a text editor, such as Notepad in Windows), is called an ASCII file.

ASIC

Acronym for application-specific integrated circuit.

ASPI

Advanced SCSI programming interface.

asset tag code

An individual code assigned to a computer, usually by a system administrator, for security or tracking purposes.

attribute

As it relates to DMI, an attribute is a piece of information related to a component. Attributes can be combined to form groups. If an attribute is defined as read-write, it may be defined by a management application.

autoexec.bat *file*

The **autoexec.bat** file (Windows 95 and MS-DOS only) is executed when you boot your computer (after executing any commands in the **config.sys** file). This start-up file contains commands that define the characteristics of each device connected to your computer, and it finds and executes programs stored in locations other than the active directory.

backup

A copy of a program or data file. As a precaution, you should back up your computer's hard-disk drive on a regular basis. Before making a change to the configuration of your computer, you should back up important start-up files from your operating system.

backup battery

The backup battery maintains system configuration, date, and time information in a special section of memory when the system is turned off.

base memory

Synonym for conventional memory. See also **conventional memory**.

batch file

An ASCII text file containing a list of commands that run in sequence. Instead of typing each command, you need only type the batch filename. The system executes the commands as if you had typed each one individually. Both files must have a filename extension of **bat**.

baud rate

A measurement of data transmission speed. For example, modems are designed to transmit data at one or more specified baud rate(s) through the COM (serial) port of a computer.

BBS

Abbreviation for bulletin board service. A computer system that serves as a central location for accessing data or relaying messages by modem. For example, Dell's TechConnect BBS contains the latest version of software, such as video drivers. If your system has a modem, you can access the BBS and download the most recent version of this software.

beep code

A diagnostic message in the form of a pattern of beeps from your computer's speaker. For example, one beep, followed by a second beep, and then a burst of three beeps is beep code 1-1-3.

binary

A base-2 numbering system that uses 0 and 1 to represent information. The computer performs operations based on the ordering and calculation of these numbers.

BIOS

Acronym for basic input/output system. Your computer's BIOS contains programs stored on a flash memory chip. The BIOS controls the following:

- Communications between the processor and peripheral devices, such as the keyboard and the video adapter
- Miscellaneous functions, such as system messages

bit

The smallest unit of information interpreted by your computer.

boot routine

When you start your computer, it clears all memory, initializes devices, and loads the operating system. Unless the operating system fails to respond, you can reboot (also called *warm boot*) your computer by pressing <Ctrl><Alt><Del>; otherwise, you must perform a cold boot by pressing the reset button or by turning the computer off and then back on.

bootable diskette

A diskette that can boot your computer to the operating system in the event that the computer will not boot from the hard-disk drive.

bpi

Abbreviation for bits per inch.

bps

Abbreviation for bits per second.

BTU

Abbreviation for British thermal unit.

bus

An information pathway between the components of a computer. Your computer contains an expansion bus that allows the processor to communicate with controllers for all the various peripheral devices connected to the computer. Your computer also contains an address bus and a data bus for communications between the processor and RAM.

byte

Eight contiguous bits of information, the basic data unit used by your computer.

C

Abbreviation for Celsius.

cache

A fast storage area that keeps a copy of data or instructions for quicker data retrieval. For example, your computer's BIOS may cache ROM code in faster RAM. Or, a disk-cache utility may reserve RAM in which to store frequently accessed information from your computer's disk drives; when a program makes a request to a disk drive for data that is in the cache, the disk-cache utility can retrieve the data from RAM faster than from the disk drive.

card-edge connector

The metal-contact section on the bottom of an expansion card that plugs into an expansion-card connector.

CD-ROM

Abbreviation for compact disc read-only memory. CD-ROM drives use optical technology to read data from CDs. CDs are read-only storage devices; you cannot write new data to a CD with standard CD-ROM drives.

cm

Abbreviation for centimeter(s).

CMOS

Acronym for complementary metal-oxide semiconductor. In computers, CMOS memory chips are often used for NVRAM storage.

*COM*n

The device names for the first through fourth serial ports on your computer are COM1, COM2, COM3, and COM4. The default interrupt for COM1 and COM3 is IRQ4, and the default interrupt for COM2 and COM4 is IRQ3. Therefore, you must be careful when configuring software that runs a serial device so that you don't create an interrupt conflict.

component

As they relate to DMI, manageable components are operating systems, computer systems, expansion cards, or peripherals that are compatible with DMI. Each component is made up of groups and attributes that are defined as relevant to that component.

config.*sys file*

The **config.sys** file (Windows 95 and MS-DOS only) is executed when you boot your computer (before running any commands in the **autoexec.bat** file). This start-up file contains commands that specify which devices to install and which drivers to use. This file also contains commands that determine how the operating system uses memory and controls files.

controller

A chip that controls the transfer of data between the processor and memory or between the processor and a peripheral device such as a disk drive or the keyboard.

control panel

The part of the computer that contains indicators and controls, such as the power switch, hard-disk drive access indicator, and power indicator.

conventional memory

The first 640 KB of RAM. Conventional memory is found in all computers. Unless they are specially designed, MS-DOS® programs are limited to running in conventional memory.

coprocessor

A chip that relieves the computer's processor of specific processing tasks. A math coprocessor, for example, handles numeric processing. A graphics coprocessor handles video rendering. The Intel® Pentium® processor, for example, includes a built-in math coprocessor.

cpi

Abbreviation for characters per inch.

CPU

Abbreviation for central processing unit. See also **processor**.

cursor

A marker, such as a block, underscore, or pointer that represents the position at which the next keyboard or mouse action will occur.

DAT

Acronym for digital audio tape.

dB

Abbreviation for decibel(s).

dBA

Abbreviation for adjusted decibel(s).

DC

Abbreviation for direct current.

Dell Diagnostics

A comprehensive set of diagnostic tests for your Dell computer. To use the diagnostics, you must boot your computer from the *Dell Diagnostics Diskette*. Refer to your *Diagnostics and Troubleshooting Guide* for more information about using the Dell Diagnostics.

Dell OpenManage™ Client Administrator/Client

A DMI browser that allows you to view your computer system's current hardware configuration and operating system version. If your system includes Dell-installed software, you can select this program from the Dell Accessories program folder.

device driver

A program that allows the operating system or some other program to interface correctly with a peripheral device, such as a printer. Most device drivers are installed when the operating system is installed.

DIMM

Acronym for dual in-line memory module. A small circuit board containing DRAM chips that connects to the system board.

DIN

Acronym for *Deutsche Industrie Norm*.

DIP

Acronym for dual in-line package. A circuit board, such as a system board or expansion card, may contain DIP switches for configuring the circuit board. DIP switches are always toggle switches, with an ON position and an OFF position.

directory

Directories help keep related files organized on a disk in a hierarchical, "inverted tree" structure. Each disk has a "root" directory; for example, a `C:\>` prompt normally indicates that you are at the root directory of hard-disk drive C. Additional directories that branch off of the root directory are called *subdirectories*. Subdirectories may contain additional directories branching off of them.

display adapter

See **video adapter**.

DMA

Abbreviation for direct memory access. A DMA channel allows certain types of data transfer between RAM and a device to bypass the processor.

DMI

Abbreviation for Desktop Management Interface. DMI enables the management of your computer system's software and hardware. DMI collects information about the system's components, such as the operating system, memory, peripherals, expansion cards, and asset tag. Information about the system's components is displayed as a MIF file or through the Dell OpenManage Client Administrator program.

DMTF

Abbreviation for Desktop Management Task Force, a consortium of companies representing hardware and software providers, of which Dell Computer Corporation is a member.

dpi

Abbreviation for dots per inch.

DPMS

Abbreviation for Display Power Management Signaling. A standard developed by the Video Electronics Standards Association (VESA®) that defines the hardware signals sent by a video controller to activate power management states in a monitor. A monitor is said to be DPMS-compliant when it is designed to enter a power management state after receiving the appropriate signal from a computer's video controller.

DRAM

Abbreviation for dynamic random-access memory. A computer's RAM is usually made up entirely of DRAM chips. Because DRAM chips cannot store an electrical charge indefinitely, your computer continually refreshes each DRAM chip in the computer.

drive-type number

Your computer can recognize a number of specific hard-disk drives. Each is assigned a drive-type number that is stored in NVRAM. The hard-disk drive(s) specified in your computer's System Setup program must match the actual drive(s) installed in the computer. The System Setup program also allows you to specify physical parameters (logical cylinders, logical heads, cylinder number, and logical sectors per pack) for drives not included in the table of drive types stored in NVRAM.

DTE

Abbreviation for data terminal equipment. Any device, such as a computer system, that can send data in digital form by means of a cable or communications line. The DTE is connected to the cable or communications line through a data communications equipment (DCE) device, such as a modem.

ECC

Abbreviation for error checking and correction.

ECP

Abbreviation for Extended Capabilities Port.

EEPROM

Acronym for electrically erasable programmable read-only memory.

EIDE

Abbreviation for enhanced integrated drive electronics. EIDE devices add one or more of the following enhancements to the traditional IDE standard:

- Data transfer rates of up to 16 MB/sec
- Support for drives other than just hard-disk drives, such as CD-ROM and tape drives
- Support for hard-disk drives with capacities greater than 528 MB
- Support for up to two controllers, each with up to two devices attached

EISA

Acronym for Extended Industry-Standard Architecture, a 32-bit expansion-bus design. The expansion-card connectors in an EISA computer are also compatible with 8- or 16-bit ISA expansion cards.

To avoid a configuration conflict when installing an EISA expansion card, you must use the EISA Configuration Utility. This utility allows you to specify which expansion slot contains the card and obtains information about the card's required system resources from a corresponding EISA configuration file.

EMC

Abbreviation for Electromagnetic Compatibility.

EMI

Abbreviation for electromagnetic interference.

EMM

Abbreviation for expanded memory manager. A utility that uses extended memory to emulate expanded memory on computers with an Intel386™ or higher processor.

EMS

Abbreviation for Expanded Memory Specification.

EPROM

Acronym for erasable programmable read-only memory.

ESD

Abbreviation for electrostatic discharge.

expanded memory

A technique for accessing RAM above 1 MB. To enable expanded memory on your computer, you must use an EMM. You should configure your system to support expanded memory only if you run application programs that can use (or require) expanded memory.

expansion bus

Your computer contains an expansion bus that allows the processor to communicate with controllers for peripheral devices, such as a network card or an internal modem.

expansion-card connector

A connector on the computer's system board or riser board for plugging in an expansion card.

extended memory

RAM above 1 MB. Most software that can use it, such as the Windows operating system, requires that extended memory be under the control of an XMM.

external cache memory

A RAM cache using SRAM chips. Because SRAM chips operate at several times the speed of DRAM chips, the processor can retrieve data and instructions faster from external cache memory than from RAM.

F

Abbreviation for Fahrenheit.

FAT

Acronym for file allocation table. The file system structure used by MS-DOS to organize and keep track of file storage. The Windows NT and OS/2® operating systems can optionally use a FAT file system structure.

FCC

Abbreviation for Federal Communications Commission.

flash memory

A type of EEPROM chip that can be reprogrammed from a utility on diskette while still installed in a computer; most EEPROM chips can only be rewritten with special programming equipment.

format

To prepare a hard-disk drive or diskette for storing files. An unconditional format deletes all data stored on the disk.

ft

Abbreviation for feet.

FTP

Abbreviation for file transfer protocol.

g

Abbreviation for gram(s).

G

Abbreviation for gravities.

GB

Abbreviation for gigabyte(s). A gigabyte equals 1,024 megabytes or 1,073,741,824 bytes.

graphics coprocessor

See **coprocessor**.

graphics mode

A video mode that can be defined as *x* horizontal by *y* vertical pixels by *z* colors.

group

As it relates to DMI, a group is a data structure that defines common information, or attributes, about a manageable component.

GUI

Acronym for graphical user interface.

h

Abbreviation for hexadecimal. A base-16 numbering system, often used in programming to identify addresses in the computer's RAM and I/O memory addresses for devices. The sequence of decimal numbers from 0 through 16, for example, is expressed in hexadecimal notation as: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, 10. In text, hexadecimal numbers are often followed by *h*.

heat sink

A metal plate with metal pegs or ribs that help dissipate heat. Most processors include a heat sink.

HMA

Abbreviation for high memory area. The first 64 KB of extended memory above 1 MB. A memory manager that conforms to the XMS can make the HMA a direct extension of conventional memory. See also **upper memory area** and **XMM**.

host adapter

A host adapter implements communication between the computer's bus and the controller for a peripheral device. (Hard-disk drive controller subsystems include integrated host adapter circuitry.) To add a SCSI expansion bus to your system, you must install or connect the appropriate host adapter.

HPFS

Abbreviation for the High Performance File System option in the OS/2 and Windows NT operating systems.

Hz

Abbreviation for hertz.

ICES

Abbreviation for Interface-Causing Equipment Standard (in Canada).

ICU

Abbreviation for ISA Configuration Utility.

I/O

Abbreviation for input/output. The keyboard is an input device, and a printer is an output device. In general, I/O activity can be differentiated from computational activity. For example, when a program sends a document to the printer, it is engaging in output activity; when the program sorts a list of terms, it is engaging in computational activity.

ID

Abbreviation for identification.

interlacing

A technique for increasing video resolution by only updating alternate horizontal lines on the screen. Because interlacing can result in noticeable screen flicker,

most users prefer noninterlaced video adapter resolutions.

internal processor cache

An instruction and data cache built in to the processor. The Intel Pentium processor includes a 16-KB internal cache, which is set up as an 8-KB read-only instruction cache and an 8-KB read/write data cache.

IPX

Acronym for internetwork packet exchange.

IRQ

Abbreviation for interrupt request. A signal that data is about to be sent to or received by a peripheral device travels by an IRQ line to the processor. Each peripheral connection must be assigned an IRQ number. For example, the first serial port in your computer (COM1) is assigned to IRQ4 by default. Two devices can share the same IRQ assignment, but you cannot operate both devices simultaneously.

ISA

Acronym for Industry-Standard Architecture. A 16-bit expansion bus design. The expansion-card connectors in an ISA computer are also compatible with 8-bit ISA expansion cards.

ITE

Abbreviation for information technology equipment.

jumper

Jumpers are small blocks on a circuit board with two or more pins emerging from them. Plastic plugs containing a wire fit down over the pins. The wire connects the pins and creates a circuit. Jumpers provide a simple and reversible method of changing the circuitry in a printed circuit board.

K

Abbreviation for kilo-, indicating 1,000.

KB

Abbreviation for kilobyte(s), 1,024 bytes.

KB/sec

Abbreviation for kilobyte(s) per second.

Kbit(s)

Abbreviation for kilobit(s), 1,024 bits.

Kbit(s)/sec

Abbreviation for kilobit(s) per second.

key combination

A command requiring you to press multiple keys at the same time. For example, you can reboot your computer by pressing the <Ctrl><Alt><Del> key combination.

kg

Abbreviation for kilogram(s), 1,000 grams.

kHz

Abbreviation for kilohertz, 1,000 hertz.

LAN

Acronym for local area network. A LAN system is usually confined to the same building or a few nearby buildings, with all equipment linked by wiring dedicated specifically to the LAN.

lb

Abbreviation for pound(s).

LED

Abbreviation for light-emitting diode. An electronic device that lights up when a current is passed through it.

local bus

On a computer with local-bus expansion capability, certain peripheral devices (such as the video adapter circuitry) can be designed to run much faster than they would with a traditional expansion bus. Some local-bus designs allow peripherals to run at the same speed and with the same width data path as the computer's processor.

LPTn

The device names for the first through third parallel printer ports on your computer are LPT1, LPT2, and LPT3.

LVD

Abbreviation for low voltage differential, the technology used to implement Ultra2/ Wide SCSI, which offers data rates of 80 MB/sec, differential data integrity, extended SCSI cable lengths, and support for up to 15 devices. Ultra2/Wide (LVD) drives and controllers are backward compatible with Ultra/Wide drives and controllers.

m

Abbreviation for meter(s).

mA

Abbreviation for milliampere(s).

mAh

Abbreviation for milliampere-hour(s).

math coprocessor

See **coprocessor**.

Mb

Abbreviation for megabit.

MB

Abbreviation for megabyte(s). The term *megabyte* means 1,048,576 bytes; however, when referring to hard-disk drive storage, the term is often rounded to mean 1,000,000 bytes.

MB/sec

Abbreviation for megabytes per second.

Mbps

Abbreviation for megabits per second.

MBR

Abbreviation for master boot record.

memory

A computer can contain several different forms of memory, such as RAM, ROM, and video memory. Frequently, the word *memory* is used as a synonym for RAM; for example, an unqualified statement such as "a computer with 16 MB of memory" refers to a computer with 16 MB of RAM.

memory address

A specific location, usually expressed as a hexadecimal number, in the computer's RAM.

memory manager

A utility that controls the implementation of memory in addition to conventional memory, such as extended or expanded memory.

memory module

A small circuit board containing DRAM chips that connects to the system board.

MHz

Abbreviation for megahertz.

MIDI

Abbreviation for musical instrument digital interface.

MIF

Acronym for management information format. A MIF file contains information, status, and links to component instrumentation. MIF files are installed into the MIF database by the DMI service layer. The content of a MIF is defined by a DTMF working committee and is published in the form of a MIF definition document. This document identifies the groups and attributes that are relevant to DMI-manageable components.

mm

Abbreviation for millimeter(s).

modem

A device that allows your computer to communicate with other computers over telephone lines.

mouse

A pointing device that controls the movement of the cursor on a screen. Mouse-aware software allows you to activate commands by clicking a mouse button while pointing at objects displayed on the screen.

MPEG

Acronym for Motion Picture Experts Group. MPEG is a digital video file format.

ms

Abbreviation for millisecond(s).

MS-DOS

Abbreviation for Microsoft Disk Operating System.

MTBF

Abbreviation for mean time between failures.

multifrequency monitor

A monitor that supports several video standards. A multifrequency monitor can adjust to the frequency range of the signal from a variety of video adapters.

mV

Abbreviation for millivolt(s).

NDIS

Abbreviation for Network Driver Interface Specification.

NIC

Acronym for network interface controller.

NLM

Abbreviation for NetWare® Loadable Module.

NMI

Abbreviation for nonmaskable interrupt. A device sends an NMI to signal the processor about hardware errors, such as a parity error.

noninterlaced

A technique for decreasing screen flicker by sequentially refreshing each horizontal line on the screen.

ns

Abbreviation for nanosecond(s), one billionth of a second.

NTFS

Abbreviation for the NT File System option in the Windows NT operating system.

NVRAM

Abbreviation for nonvolatile random-access memory. Memory that does not lose its contents when you turn off your computer. NVRAM is used for maintaining the date, time, and system configuration information.

online access service

A service that typically provides access to the Internet, e-mail, bulletin boards, chat rooms, and file libraries. CompuServe® is an example of an online access service.

OS/2

Abbreviation for Operating System/2.

OTP

Abbreviation for one-time programmable.

parallel port

An I/O port used most often to connect a parallel printer to your computer. You can usually identify a parallel port on your computer by its 25-hole connector.

parameter

A value or option that you specify to a program. A parameter is sometimes called a *switch* or an *argument*.

partition

You can divide a hard-disk drive into multiple physical sections called *partitions* with the **fdisk** command. Each partition can contain multiple logical drives.

After partitioning the hard-disk drive, you must format each logical drive with the **format** command.

PCI

Abbreviation for Peripheral Component Interconnect. A standard for local-bus implementation developed by Intel Corporation.

peripheral device

An internal or external device—such as a printer, a disk drive, or a keyboard—connected to a computer.

PGA

Abbreviation for pin grid array, a type of processor socket that allows you to remove the processor chip.

pixel

A single point on a video display. Pixels are arranged in rows and columns to create an image. A video resolution, such as 640 x 480, is expressed as the number of pixels across by the number of pixels up and down.

Plug and Play

An industry-standard specification that makes it easier to add hardware devices to personal computers. Plug and Play provides automatic installation and configuration, compatibility with existing hardware, and dynamic support of mobile computing environments.

POST

Acronym for power-on self-test. Before the operating system loads when you turn on your computer, the POST tests various system components such as RAM, the disk drives, and the keyboard.

ppm

Abbreviation for pages per minute.

PQFP

Abbreviation for plastic quad flat pack, a type of processor socket in which the processor chip is permanently mounted.

processor

The primary computational chip inside the computer that controls the interpretation and execution of arithmetic and logic functions. Software written for one processor must usually be revised to run on another processor. *CPU* is a synonym for processor.

Program Diskette Maker

The Program Diskette Maker allows you to create program diskette sets, or master copies, of software that Dell installed on your computer system. It is essential that you create these diskette sets as soon as possible. You may need a set of master diskettes if you ever experience problems with your hard-disk drive and need to reinstall your Dell-installed software. If your system includes Dell-installed software, you can select this program from the Dell Accessories program folder.

program diskette set

The set of diskettes from which you can perform a complete installation of an operating system or application program. When you reconfigure a program, you often need its program diskette set.

protected mode

An operating mode supported by 80286 or higher processors, protected mode allows operating systems to implement:

- A memory address space of 16 MB (80286 processor) to 4 GB (Intel386 or higher processor)
- Multitasking
- Virtual memory, a method for increasing addressable memory by using the hard-disk drive

The Windows NT, OS/2, and UNIX® 32-bit operating systems run in protected mode. MS-DOS cannot run in protected mode; however, some programs that you can start from MS-DOS, such as the Windows operating system, are able to put the computer into protected mode.

PS/2

Abbreviation for Personal System/2.

PXE

Abbreviation for Preboot eXecution Environment, which loads agents remotely onto systems to perform management tasks in the absence of a running operating system.

RAM

Acronym for random-access memory. The computer's primary temporary storage area for program instructions and data. Each location in RAM is identified by a number called a *memory address*. Any information stored in RAM is lost when you turn off your computer.

RAMDAC

Acronym for random-access memory digital-to-analog converter.

read-only file

A read-only file is one that you are prohibited from editing or deleting. A file can have read-only status if:

- Its read-only attribute is enabled.
- It resides on a physically write-protected diskette or on a diskette in a write-protected drive.
- It is located on a network in a directory to which the system administrator has assigned read-only rights to you.

readme file

A text file included with a software package or hardware product that contains information supplementing or updating the documentation for the software or hardware. Typically, readme files provide installation information, describe new product enhancements or corrections that have not yet been documented, and list known problems or other things you need to be aware of as you use the software or hardware.

real mode

An operating mode supported by 80286 or higher processors, real mode imitates the architecture of an 8086 processor.

refresh rate

The rate at which the monitor redraws the video image on the monitor screen. More precisely, the refresh rate is the frequency, measured in Hz, at which the screen's horizontal lines are recharged (sometimes also referred to as its *vertical frequency*). The higher the refresh rate, the less video flicker can be seen by the human eye. The higher refresh rates are also noninterlaced.

RFI

Abbreviation for radio frequency interference.

RGB

Abbreviation for red/green/blue.

ROM

Acronym for read-only memory. Your computer contains some programs essential to its operation in ROM code. Unlike RAM, a ROM chip retains its contents even after you turn off your computer. Examples of code in ROM include the program that initiates your computer's boot routine and the POST.

rpm

Abbreviation for revolutions per minute.

RTC

Abbreviation for real-time clock. Battery-powered clock circuitry inside the computer that keeps the date and time after you turn off the computer.

SCSI

Acronym for small computer system interface. An I/O bus interface with faster data transmission rates than standard ports. You can connect up to seven devices (15 for some newer SCSI types) to one SCSI interface.

SDMS

Abbreviation for SCSI device management system.

SDRAM

Abbreviation for synchronous dynamic random-access memory. SDRAM is a memory technology that improves the performance of your system's memory subsystem by reducing the need for wait states. SDRAM devices have a synchronous interface to the devices to which they are connected and are governed by the system clock. These features reduce the need for wait states often required for

conventional memory devices to ensure that timing signals have been set up correctly.

In equivalent configurations, a computer with SDRAM will have faster memory performance than a computer with EDO memory.

sec

Abbreviation for second(s).

serial port

An I/O port used most often to connect a modem to your computer. You can usually identify a serial port on your computer by its 9-pin connector.

service tag number

A bar code label on the computer that identifies it when you call Dell for customer or technical support.

shadowing

A computer's system and video BIOS code is usually stored on ROM chips. Shadowing refers to the performance-enhancement technique that copies BIOS code to faster RAM chips in the upper memory area (above 640 KB) during the boot routine.

SIMD

Abbreviation for Single Instruction Multiple Data.

SIMM

Acronym for single in-line memory module. A small circuit board containing DRAM chips that connects to the system board.

Slot 2 SEC

Abbreviation for Slot 2 single-edge contact. Newer Intel processors, such as the Intel Pentium II Xeon™ processor, use this type of connector as an interface between the processor and the system board.

SMART

Acronym for Self-Monitoring Analysis and Reporting Technology. A technology that allows hard-disk drives to report errors and failures to the system BIOS, which then displays an error message on the screen. To take advantage of this technology, you must have a SMART-compliant hard-disk drive and the proper support in the system BIOS.

SNMP

Abbreviation for Simple Network Management Protocol. SNMP is an industry-standard interface that allows a network manager to remotely monitor and manage workstations.

SRAM

Abbreviation for static random-access memory. Because SRAM chips do not require continual refreshing, they are substantially faster than DRAM chips.

SVGA

Abbreviation for super video graphics array. VGA and SVGA are video standards for video adapters with greater resolution and color display capabilities than previous standards.

To display a program at a specific resolution, you must install the appropriate video drivers and your monitor must support the resolution. Similarly, the number of colors that a program can display depends on the capabilities of the monitor, the video driver, and the amount of video memory installed in the computer.

switch

On a computer system board, switches control various circuits or functions in your computer system. These switches are known as *DIP switches;* they are normally packaged in groups of two or more switches in a plastic case. Two common DIP switches are used on system boards: *slide* switches and *rocker* switches. The names of the switches are based on how the settings (on and off) of the switches are changed.

syntax

The rules that dictate how you must type a command or instruction so that the computer understands it.

system board

As the main circuit board, the system board usually contains most of your computer's integral components, such as the following:

- Processor
- RAM
- Controllers for standard peripheral devices, such as the keyboard
- Various ROM chips

Frequently used synonyms for system board are *motherboard* and *logic board*.

system configuration information

Data stored in memory that tells a computer what hardware is installed and how the computer should be configured for operation.

system diskette

System diskette is a synonym for *bootable diskette*.

system memory

System memory is a synonym for *RAM*.

System Setup program

A BIOS-based program that allows you to configure your computer's hardware and customize the computer's operation by setting such features as password protection and energy management. Some options in the System Setup program require that you reboot the computer (or the computer may reboot automatically) in order to make a hardware configuration change. Because the System Setup program is stored in NVRAM, any settings remain in effect until you change them again.

system.ini file

A start-up file for the Windows operating system. When you start Windows, it consults the **system.ini** file to determine a variety of options for the Windows operating environment. Among other things, the **system.ini** file records which video, mouse, and keyboard drivers are installed for Windows.

Running the Control Panel or Windows Setup program may change options in the **system.ini** file. On other occasions, you may need to change or add options to the **system.ini** file manually with a text editor, such as Notepad.

termination

Some devices (such as the last device at each end of a SCSI cable) must be terminated to prevent reflections and spurious signals in the cable. When such devices are connected in a series, you may need to enable or disable the termination on these devices by changing jumper or switch settings on the devices or by changing settings in the configuration software for the devices.

text editor

An application program for editing text files consisting exclusively of ASCII characters. Windows Notepad is a text editor, for example. Most word processors use proprietary file formats containing binary characters, although some can read and write text files.

text mode

A video mode that can be defined as *x* columns by *y* rows of characters.

time-out

A specified period of system inactivity that must occur before an energy conservation feature is activated.

tpi

Abbreviation for tracks per inch.

TSR

Abbreviation for terminate-and-stay-resident. A TSR program runs "in the background." Most TSR programs implement a predefined key combination (sometimes referred to as a *hot key*) that allows you to activate the TSR program's interface while running another program. When you finish using the TSR program, you can return to the other application

program and leave the TSR program resident in memory for later use.

TSR programs can sometimes cause memory conflicts. When troubleshooting, rule out the possibility of such a conflict by rebooting your computer without starting any TSR programs.

UL

Abbreviation for Underwriters Laboratories.

UMB

Abbreviation for upper memory blocks.

upper memory area

The 384 KB of RAM located between 640 KB and 1 MB. If the computer has an Intel386 or higher processor, a utility called a *memory manager* can create UMBs in the upper memory area, in which you can load device drivers and memory-resident programs.

UPS

Abbreviation for uninterruptible power supply. A battery-powered unit that automatically supplies power to your computer in the event of an electrical failure.

USB

Abbreviation for Universal Serial Bus. A USB connector provides a single connection point for multiple USB-compliant devices, such as mice, keyboards, printers, and computer speakers. USB devices can also be connected and disconnected while the system is running.

utility

A program used to manage system resources—memory, disk drives, or printers, for example.

UTP

Abbreviation for unshielded twisted pair.

V

Abbreviation for volt(s).

VAC

Abbreviation for volt(s) alternating current.

VCCI

Abbreviation for Voluntary Control Council for Interference.

VCR

Abbreviation for video cassette recorder.

VDC

Abbreviation for volt(s) direct current.

VESA

Acronym for Video Electronics Standards Association.

VGA

Abbreviation for video graphics array. VGA and SVGA are video standards for video adapters with greater resolution and color display capabilities than previous standards.

To display a program at a specific resolution, you must install the appropriate video drivers and your monitor must support the resolution. Similarly, the number of colors that a program can display depends on the capabilities of the monitor, the video driver, and the amount of video memory installed for the video adapter.

VGA feature connector

On some systems with a built-in VGA video adapter, a VGA feature connector allows you to add an enhancement adapter, such as a video accelerator, to your computer. A VGA feature connector can also be called a *VGA pass-through connector*.

video adapter

The logical circuitry that provides—in combination with the monitor—your computer's video capabilities. A video adapter may support more or fewer features than a specific monitor offers. Typically, a video adapter comes with video drivers for displaying popular application programs and

operating systems in a variety of video modes.

On some Dell computers, a video adapter is integrated into the system board. Also available are many video adapter cards that plug into an expansion-card connector.

Video adapters often include memory separate from RAM on the system board. The amount of video memory, along with the adapter's video drivers, may affect the number of colors that can be simultaneously displayed. Video adapters can also include their own coprocessor for faster graphics rendering.

video driver

A program that allows graphics-mode application programs and operating systems to display at a chosen resolution with the desired number of colors. A software package may include some "generic" video drivers. Any additional video drivers may need to match the video adapter installed in the computer.

video memory

Most VGA and SVGA video adapters include memory chips in addition to your computer's RAM. The amount of video memory installed primarily influences the number of colors that a program can display (with the appropriate video drivers and monitor capabilities).

video mode

Video adapters normally support multiple text and graphics display modes. Character-based software displays in text modes that can be defined as *x* columns by *y* rows of characters. Graphics-based software displays in graphics modes that can be defined as *x* horizontal by *y* vertical pixels by *z* colors.

video resolution

Video resolution—800 x 600, for example—is expressed as the number of pixels across by the number of pixels up and down. To display a program at a specific graphics resolution, you must install the appropriate video drivers and your monitor must support the resolution.

virtual memory

A method for increasing addressable RAM by using the hard-disk drive. For example, in a computer with 16 MB of RAM and 16 MB of virtual memory set up on the hard-disk drive, the operating system would manage the system as though it had 32 MB of physical RAM.

virus

A self-starting program designed to inconvenience you. Virus programs have been known to corrupt the files stored on a hard-disk drive or to replicate themselves until a computer or network runs out of memory.

The most common way that virus programs move from one computer to another is via "infected" diskettes, from which they copy themselves to the hard-disk drive. To guard against virus programs, you should do the following:

- Periodically run a virus-checking utility on your computer's hard-disk drive
- Always run a virus-checking utility on any diskettes (including commercially sold software) before using them

VLSI

Abbreviation for very-large-scale integration.

Vpp

Abbreviation for peak-point voltage.

VRAM

Abbreviation for video random-access memory. Some video adapters use VRAM chips (or a combination of VRAM and DRAM) to improve video performance. VRAM is dual-ported, allowing the video adapter to update the screen and receive new image data at the same time.

W

Abbreviation for watt(s).

WH

Abbreviation for watt-hour(s).

win.ini *file*

A start-up file for the Windows operating system. When you start Windows, it consults the **win.ini** file to determine a variety of options for the Windows operating environment. Among other things, the **win.ini** file records what printer(s) and fonts are installed for Windows. The **win.ini** file also usually includes sections that contain optional settings for Windows application programs that are installed on the hard-disk drive.

Running the Control Panel or Windows Setup program may change options in the **win.ini** file. On other occasions, you may need to change or add options to the **win.ini** file manually with a text editor such as Notepad.

Windows 95

An integrated and complete Microsoft Windows operating system that does not require MS-DOS and that provides advanced operating system performance, improved ease of use, enhanced workgroup functionality, and simplified file management and browsing.

Windows NT

High-performance server and workstation operating system software developed by Microsoft that is intended for technical, engineering, and financial applications.

write-protected

Read-only files are said to be *write-protected*. You can write-protect a 3.5-inch diskette by sliding its write-protect tab to the open position or by setting the write-protect feature in the System Setup program.

XMM

Abbreviation for extended memory manager, a utility that allows application programs and operating systems to use extended memory in accordance with the XMS.

XMS

Abbreviation for eXtended Memory Specification.

ZIF

Acronym for zero insertion force. Some computers use ZIF sockets and connectors to allow devices such as the processor chip to be installed or removed with no stress applied to the device.

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